

HENRY LESTER  
INSTITUTE OF  
MEDICAL RESEARCH

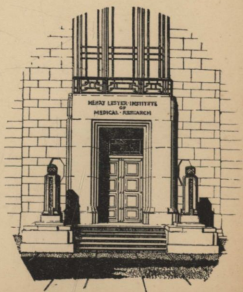
Annual Report

1935



HENRY LESTER  
INSTITUTE OF  
MEDICAL RESEARCH

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HENRY LESTER INSTITUTE OF MEDICAL  
RESEARCH  
(SHANGHAI)

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### ERIC REID (1906-1935)

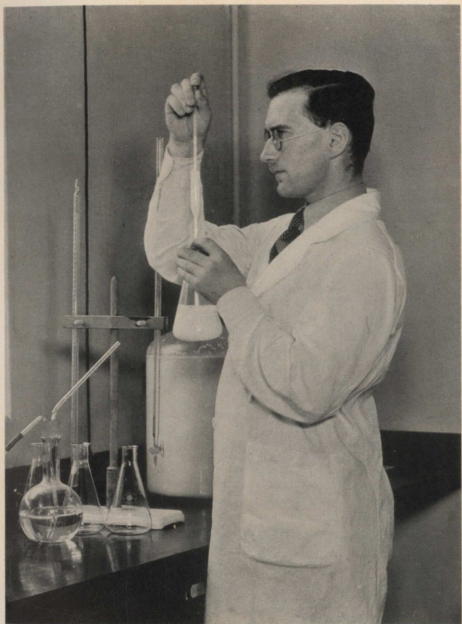
ERIC REID, who died in Shanghai on November 24th, 1935, was born on October 3rd, 1906, at Gamrie, in Banffshire, Scotland. After his earlier training at the Macduff Public School he spent six strenuous years at Aberdeen University where, as an undergraduate, he achieved distinction, taking the first place in his class with the chemistry medal in 1928. His outstanding ability as a chemist was marked by First Class Honours in 1929, and the award of the Robbie Scholarship in chemistry for two successive years. In post-graduate work he was awarded for three years, 1929 to 1932, Research Scholarships from the Ministry of Agriculture for Scotland, during which time he worked under Orr, Macleod and Magee, at the Rowett Research Institute, Aberdeen, upon the absorption of foodstuffs, chiefly carbohydrates and phosphates, from the alimentary canal. In 1931 he worked at Western Reserve University, U.S.A. under Myers on blood and tissue diastases; and later under Hart, at the College of Agriculture, California, he studied the sulph-hydryl compounds in the blood and tissues.

ERIC REID coming to the HENRY LESTER INSTITUTE OF MEDICAL RESEARCH on May 7th, 1933, represented the experience of a man from an institute in Great Britain associated with the study of nutrition, both from the agricultural and medical points of view. In drawing up his programme of research in Shanghai he recognized the need for more basic facts regarding the composition of local foodstuffs, general dietary surveys and for studies of ways to meet the requirements of infant feeding. During the short two and a half years of his work in Shanghai much of this was accomplished. Four publications upon soybean-egg powder summarize the results of his earnest endeavours to find a suitable infant food made from local materials. His later fluorine studies were part of a wider programme dealing with the inorganic elements in the diet, a field of study emphasized by the Rowett Institute.

ERIC REID brought to his work and to those about him a virility of body, mind and character of unusual force, masked somewhat by a modesty and kindliness which readily won him friends wherever he went. He was utterly dependable, he had a fine spirit of co-operation, and his scientific contribution to China, though short, had a quality about it of the finest merit.

ERIC REID was a member of the PHYSIOLOGICAL SOCIETY and of the BIOCHEMICAL SOCIETY OF GREAT BRITAIN, of the CHINESE PHYSIOLOGICAL SOCIETY, and of the SIGMA XI OF AMERICA.

B.E.R.



ERIC REID (1906-1935)

## INTRODUCTION

DURING the year 1935 the work of the Institute has continued along the lines indicated in previous reports, and I think we may claim that definite progress has been made along all fronts.

In the Clinical Division, Dr. Platt has extended the work of Peters and his colleagues on vitamin B<sub>1</sub>, and has shown that beriberi is undoubtedly a disease presenting biochemical changes in the body fluids characteristic of B<sub>1</sub> deficiency, though this does not explain the whole of the clinical picture in different types of the disease.

In the Division of Physiological Sciences the investigation of factory diets, as presented recently in a report of work done in collaboration with the Industrial Section of the Shanghai Municipal Council, and published by the Chinese Medical Association, has led to a good deal of attention from the lay community. It is, however, not the function of a research institute to enter the field of social politics, and it should be understood that this work is only part of a general survey of Chinese diets made in an attempt to unravel the nutritional factor in the development of disease. Dr. Read and his colleagues have also shown through their analyses of the vitamin content of Chinese foods that instinct and custom when not interfered with by modern civilization provide an adequate amount of these necessary dietetic principles. Of course common sense should tell us as much since there is no civilization that has shown the persistence of China, and this would have been impossible if diets had always been inadequate.

In the Division of Pathological Sciences a definite advance has been made in the analysis of the antigenic structure of the typhoid bacillus and in the preparation of a serum which is already proving its value in the treatment of this all too prevalent and debilitating disease. As previously stated, the work of this division involves a good deal of field investigation, especially in connection with entomology and parasitology, so that with a view to giving workers in other countries a better idea of the ecological conditions responsible for the spread of parasitic disease in China, I have asked Dr. Robertson to give a graphic account of his experiences in the field.

The Directorate as such is not responsible for any particular sphere of research. It exists for the benefit of the Divisions, but short reports of the work done by the Statistical Department and of



the very valuable work which is being carried out by Dr. Maxwell, especially in connection with leprosy, follow this introductory statement. Some integration will, however, become necessary as time goes on. Dr. Alexis Carrel of the Rockefeller Institute has recently written a book on "Man—The Unknown," the main thesis of which is indicated by the title. He points out that animal research is not sufficient to unravel the real cause and nature of disease in man, and that more attention must be paid to a true scientific analysis of the psychobiological factors in health and disease. This view is endorsed by the policy of the Rockefeller Foundation as set forth in its last annual report, while the Medical Research Council in Great Britain is now supporting a Neurological Research Unit at the National Hospital for Diseases of the Nervous System.

#### STAFF CHANGES

We were very sorry to say good-bye to Dr. Gear in the early part of 1935, though it had always been recognized that his real work lay in the public health service of the country where he originated. Dr. Gear, through his conduct of the general survey of disease in hospital populations carried out in co-operation with the Chinese Medical Association, has given us a base line and thereby laid the foundation for a statistical analysis of disease incidence in China. Further, by his work in co-operation with the Shanghai Municipal Council in an investigation of conditions in printing works, he opened the way for a better appreciation of what modern industrialization means to the Chinese worker.

Dr. Li Yuan Po, having completed a three years' appointment in the Division of Pathological Sciences, resigned to take up private work. Coming to us after having worked at the Pasteur Institute in Paris, he brought with him the true scientific spirit which we owe so much to the work of Pasteur himself. Dr. Li carried out valuable research in serology and bacteriology, his work on a medium for the cultivation of the spirochæte of relapsing fever, as well as his work on the culture of the tubercle bacillus meeting with recognition abroad, while he also made a valuable contribution to our knowledge of the distribution of blood groups in Chinese sera.

Dr. F. F. Tang has been absent on leave as visiting worker at the National Institute for Medical Research in London, a free return passage being provided by the Holt Line. We are much indebted both to the National Institute for its acceptance of Dr. Tang as a visiting worker and to the Holt Line for extending its travelling fellowship scheme to the staff of the Institute. Moreover, this

arrangement whereby we are able to send annually one of our senior workers to study in Great Britain shows how Sino-British friendship may be fostered by co-operation between three British organizations.

Finally, the Institute suffered a severe and entirely unexpected loss through the accidental death of Dr. Eric Reid. Eric Reid, an unassuming and lovable personality, had already done much good work in the field of nutrition during his short life in China, and his position will be very difficult to fill. A special tribute to his work appeared in Chinese in the "Chinese Journal of Physiology," and is reproduced in English as part of this report.

#### RELATIONS WITH OTHER INSTITUTIONS

The Institute has continued to maintain its outside contacts in a variety of ways.

Visits were received from Professor Carlson of Chicago, Professor Cannon of Harvard, Professor Brumpt of Paris, and Professor Blacklock of Liverpool. These visits from distinguished scientists are very stimulating and we only wish that funds were available to enable us to invite distinguished men to come to the Institute for longer periods. As will be seen, however, from the appendix to this report the Institute has been able to repay some of the help received from other institutions by sending them local material for exhibition and teaching purposes.

Further from our lecture programme it will be seen that we have been privileged to welcome as lecturers representatives of other institutions in China, while the lecture hall has also been used for meetings organized by local medical societies.

The Institute took part in two conferences in 1935. In April a number of delegates visited Peiping for the 8th Annual Conference of the Chinese Physiological Society, while in November a larger number, representative of all divisions, made the journey to Canton for the "Centenary" Meeting of the Chinese Medical Association. At this Conference it was decided to organize during the next biennium a general nutrition survey under the chairmanship of Dr. Bernard Read, while a document safeguarding the interests of animals used in medical research was accepted by the combined societies taking part in the conference. The Chinese Society of Pathology and Microbiology took a prominent part in the Conference as evidenced recently by the publication of a special pathological supplement to the "Chinese Medical Journal."

The financial depression has not been without its effect on the Institute, and it has been necessary to reduce more particularly the number of scholarships and fellowships available for temporary



appointment. If, however, we are able to maintain the regular staff, it is hoped that the general efficiency of the work being done will not suffer. At the same time, the life of a research institute depends more on temporary and visiting workers than that of a purely educational institution. I hope, therefore, that when times are better we may again be able to offer fellowships to temporary workers and that in the meantime visiting workers will continue to use the facilities of the Institute in a similar manner to that practised in the institutions of Great Britain and America. In this connection we should particularly welcome an opportunity for closer relation with the University of Hongkong. The University had a good deal to do with the establishment of the Institute and the prestige of British medical work in China would undoubtedly gain much by a closer interchange of workers between the two institutions. By conferring the degree of Doctor of Laws *honoris causa* on the Director, the University has recognized the Institute as a centre for the prosecution of medical research.

FIELD MEDICAL  
RESEARCH IN CHINA

The research worker who wishes to make a success of field work should be of broad sympathetic understanding, infinite patience and above all equipped with sound common sense and a sense of humour. Much depends on obtaining the goodwill of the agricultural population and of the local inhabitants where enquiries are being undertaken. The scientific method is not the whole story nor is it immediately practicable if dissociated from other considerations. The Pasteurian method is the method "par excellence" in China. The ideal worker is the patriotic Chinese citizen who is stimulated to his endeavours by finding something which he believes will be an advantage to his countrymen in suppressing either a grave condition of nutritional disorder or alleviating, and if possible, preventing the harassing effects of some parasite. Personal advantage has no place in such an altruistic concept, but if such a worker can apply the scientific method to his work so much the better. Pasteur was a field research worker of the very first order and only retired to his laboratory when it was strictly necessary, and even there he was completely original in his line of approach. Some say this is entirely due to genius, but genius is defined as the infinite capacity for taking pains. Although one advocates the Pasteurian example for incentive and approach, one recommends the statistical method as a useful tool in the planning and conduct of field observations. Pasteur used this method instinctively, but being a genius

his logic and uncommon sense were developed to such a high degree that he could well dispense with any mechanical approach to his problems.

It is chiefly in connection with research work in parasitology and entomology that field observation has been an essential part of the work of the Institute, while we have limited ourselves to subjects of enquiry, the material for which is readily obtainable in the neighbourhood of Shanghai or where the problem is to be found as a whole in the countryside around us. It is obvious that we are bound by policy and finance to apply all our energies to subjects of research the major part of which can be accomplished with our facilities here in Shanghai. In this connection reference should be made to the various hospitals organized by medical missionaries which provide extremely valuable centres from which information can be gained and help obtained in enquiries which if conducted under other auspices would tend to be regarded with suspicion or would at least be rendered much more difficult.

In the divisional section of this report attention is drawn to a number of disease conditions which are being investigated by the staff of this Institute and in which field observations play an important part.

The fundamental consideration underlying field research in this part of China is the existence of a huge fertile plain composed of rich alluvial soil which has been intensively cultivated by countless generations of perhaps the most highly skilled agriculturists in the world. This plain was formed and is still being formed as the delta system of the Yangtze Kiang, one of the great rivers of the world. The region is intersected by a veritable labyrinth or network of waterways, canals and slowly flowing rivers. There are many large lakes which are shallow. Most of these waterways are navigable for the countless small craft used by the inhabitants for the transportation of their market produce in fact for almost all the activities associated with transportation and agriculture. A vast population constantly spends its entire existence afloat in the different varieties of sampans, junks, barges and so on used. The waterways abound in fish, crustaceans, molluscs, most of which are used for food. The staple industries are agricultural ; rice, cotton and silk being the main activities.

The area is very densely populated and there are a number of important cities such as Soochow and Kashing which form centres for the distribution of the products of the country. The use of modern machinery and a factory system is to be found in Shanghai

and Wusih. Such facts govern the type of disease which is to be found affecting the inhabitants. Geographically the situation is favourable for mosquito breeding owing to the swampy nature of the plain and the intensive irrigation system connected with rice cultivation. We therefore have diseases such as Malaria and Filariasis in which the mosquito plays the rôle of vector. The research aspect with regard to mosquito breeding can be furthered by studying the breeding in insectaries constructed in the natural environment of the mosquito.

Problems connected with the nutrition of a population such as that in Central China provide the chief factors connected with diseases, that is to say nutrition in its broadest sense. A population which ultimately depends on the soil on which it lives for food has to obey the natural law of the conservation of energy by returning to the soil the nitrogenous substances it has withdrawn in crops. Thus we have the practice of intensive fertilization of the soil with human and animal excreta practised through the ages. This is in itself a practice which is the soundest agriculture but unfortunately it keeps up the vicious cycle of many important helminthic diseases. Excellent illustrations of these factors in the natural history of disease can be obtained by a study of the Trematodes, but while the life cycle of the chief disease producing members of this group is fairly well known the actual state of affairs in the country is largely a matter of conjecture. We may have matters of enquiry which only represent one detail of a larger problem and this detail has to be worked out under field conditions. Examples are readily found in such a disease as *Schistosomiasis japonica*, a condition potentially affecting several millions of persons in the delta region of the Yangtze Kiang. Yet the secret of the control of this wide-spread evil may be found in an intensive field enquiry into the habits of a particularly insignificant mollusc.

Paragonimiasis is commented upon in the divisional report but it is of considerable interest to note that this disease is in all probability merely accidental in man whilst it undoubtedly is very prevalent in wild animals particularly leopards and tigers. Almost all of these animals recently shot or captured in the neighbouring provinces of Chekiang and Anhwei have been found to be affected. The fresh water crab *Potamon denticulatus* is found in the fresh running water streams of the hill regions on the fringe of the cultivated plains. The culinary habits of the people of one or two limited districts near Shaoshing have caused the disease to occur in man. The methods of preparing food and the local customs are most



TYPICAL ANOPHELES BREEDING PLACE



THE MOLLUSCAN HOST OF SCHISTOSOMIASIS

important in research upon helminthic diseases. One can cite Clonorchiasis in this connection as it is only prevalent in communities which have a predilection for uncooked fresh water fish.

In Fasciolopsiasis we have a parasite which has a most interesting life cycle. The salient facts have been fairly well established but there are particular features in the larval stages which well illustrate the necessity of fully understanding the life cycle as it exists in natural conditions.

Certain water plants such as the water bamboo, water chestnut and water calthrop or ling act as intermediate hosts in a manner which is more important than mere mechanical transmission since the cercariæ which emerge from the specific mollusc attach themselves as metacercariæ to the skins of the plants. Raw Ling is difficult to peel and it is very often first bitten at. The cysts are left on the teeth and later swallowed with food. It is only the red Ling found in endemic areas such as Shao-san in Chekiang province that is heavily infected with Fasciolopsis cysts. Various other varieties are quite free from infection. A study of this question immediately leads us to note that the botanical literature on such water plants in China is very scanty and imperfect. Further instances of the importance of a knowledge of botanical flora in field work is well brought out in connection with Elephantiasis. This condition is common in the Huchow district, many villages having 30 per cent. or 40 per cent. of the inhabitants affected. The larvæ of the mosquito *Mansoni uniformis*, which probably acts as a vector, attach themselves by a breathing tube to the roots of water plants and thus obtain air from the roots of aquatic plants without coming to the surface. Such field data are essential in the proper interpretation of laboratory findings in many problems in entomology.

Again an insect may be highly susceptible to experimental infection with a disease organism under laboratory conditions and yet not be a factor in the transmission of the disease under natural conditions in the field because its natural feeding habit may not bring it in contact with man. Both sets of findings have to be correlated in order to assign a species of insect its proper place in the epidemiology of a disease under local conditions.

Different species of mosquitoes show a particular preference as to what type of water they will breed in. We have found the type of field insectary illustrated which is in use at our field entomological station at Kaochiao very practical for breeding and studying *Anopheles sinensis* under natural conditions. The construction is a wooden and bamboo frame work supporting wire



gauze netting. These insectaries enable us to study larval breeding where the customary factors all exist such as aquatic vegetation and the normal temperature and reaction of the water.

In the breeding rooms at the Lester Institute we are able to vary experimentally many of these natural factors, therefore the field insectaries are supplementary to the laboratory breeding rooms and used for different purposes.

It is of interest to note that the Shanghai Waterworks tap water used in the Institute which is highly purified and chlorinated is unsuitable for many biological experiments connected with the artificial cultivation of mosquitoes, molluscs, crustaceans and fish. We have overcome this difficulty by using shallow well water and recently have had such a well constructed in the Institute grounds. At the same time artificial conditions never absolutely simulate the environment which exists in nature.

Water or some factor related to water plays an important rôle in very many of our field problems. We even use water transportation very largely when visiting endemic centres of the various parasitic diseases under investigation.

A typical field collecting trip diary may be of interest as an example of the type of work being undertaken although the details and organization differ to some extent dependent on the general object in view.

September 15th, 1935. Preparations made in the Institute for collecting biological materials in the field relating to Schistosomiasis, Fasciolopsiasis, Paragonimiasis and Filariasis. Metal containers, bamboo tubes, specimen bottles and a paraphernalia of field equipment sorted out at the Institute. Gum boots, rubber gloves and forceps included as these are essential in protecting the skin of the workers engaged in gathering snails infected with the cercariæ of *Schistosoma japonicum*.

September 16th. Left by motor-car for Kashing about 80 miles distant using the Hangchow highway. The equipment is packed in light bamboo baskets. We cross the ferry at Minghong and proceed at a steady 30 m.p.h. which is about the highest average speed desirable especially as the highway follows for many miles the ancient sea wall bordering on Hangchow bay. We turn off this road at Chapu and strike inland via Pingwu a small picturesque walled city the inhabitants of which at this particular season of the year are busily engaged exporting water melons in a variety of craft to neighbouring towns especially to Shanghai. At Kashing we garage the car in the garden of a Chinese gentleman's house as the



NATURAL HABITAT OF *POTAMON DENTICULATUS*



VEGETABLE HOSTS OF *FASCIOLOPSIS BUSKI*



service system of garages has not kept up with the rate at which China's new highway system has been developed. Bus stations are the only places petrol and minor service can be obtained anywhere except in the largest towns. At Kashing we transfer our equipment to a motor house-boat belonging to one of us and here we rig up a small temporary laboratory with our field microscope and collecting equipment. Since we have a certain area where we are studying the bionomics of the *Oncomelania hupensis* mollusc, the intermediate host of Schistosomiasis in this region throughout the season, we first set out to make our snail collections using a small shallow draft sampan driven by an outboard motor. We thus can penetrate the smaller creeks intersecting the rice paddies. The gum boots are put on and forceps handed out to the various persons engaged in collecting the snails which are to be found ashore in the small ditches and irrigation channels.

September 17th. We desire to make a collection of water plants implicated in transmitting the larvæ of Fasciolopsis, we do not collect the Kashing ling which is to be found on the lake where the house-boat is anchored. The water here being reasonably clean and the vicious cycle of the parasite non-existent in the neighbourhood. We also desire to investigate the streams which come from the hilly region bordering on the Taihu lake so we leave in the motor launch for Huchow which is about 50 miles off. A stop is made at the A.P.C. agents, for kerosene, which is used as fuel by the engine. Our speed is about 8 to 10 miles an hour dependent on the breadth and depth of the waterways. There are various alternative routes on the outgoing journey, we travel on the Grand Canal as far as Pingwang. Some stops are made on the way to collect mosquito larvæ for identification purposes. On arrival at Huchow we tie up to the bank in a small canal close to the hospital compound and make our arrival known to the medical superintendent who has kindly given us facilities to make this a centre for field work in the neighbourhood. Our party on this occasion consists of the Head of the Division assisted by the Associate in Entomology and the Research Fellow in Helminthology along with a senior and junior technician. Some of the party have come by bus via Hangchow as it has been arranged to accompany a distinguished French scientist who wishes to see as much of the parasitological field work he can in a limited time.

September 18th. In the early morning of the following day an expedition is made by rickshas to the markets of the city to purchase various kinds of vegetables such as ling, water chestnuts and water

bamboo also shrimps and other local products. A number of bags are ordered to be made out of a cheap kind of cotton fabric. These bags are used to hand out to children in the villages when we are collecting the stone crabs. In this way we can quickly obtain a large number of specimens when scores of helpers are collecting. The children are glad to get a few coppers for a bagful of the crabs.

On this occasion we divide forces and one party headed by the helminthologist leaves by car to examine the fresh water streams flowing down from the neighbouring mountains about 10 miles off. The final stage being accomplished on foot using the pathways between the fields. The French scientist elects to accompany this party. Later, arrangements are made for the technicians to collect many thousands of crabs and also a number of cats from the area. On an extremely hot day the return from such an expedition may leave the most energetic field worker distinctly tired. The Head of the Division recollects returning in a ricscha on one occasion after about 5 or 6 miles tramping in the hot sun with the mercury around 96°F in the shade. A couple of stone jars full of rather inanimate crabs at his feet and a couple of distinctly animated cats in a wicker basket reposing in the hood of the ricscha behind his head. A variety of other trophies of the chase were festooned about the dilapidated vehicle, some of which did not add to the gaiety of the occasion especially as the pathway was very uneven and bumpy.

The second party headed by the entomologist accompanied the Head of the Division in the motor launch to visit villages which the Huchow hospital doctors had found to be noted centres of Elephantiasis. The main objective on this trip was to obtain motion pictures of the sufferers in their own homes or working in the fields. It was very striking when we arrived at these villages after crossing some rather beautiful lakes and going up a perfect labyrinth of small creeks to find almost every second person one met to have some degree of elephantiasis. Women as well as men apparently being equally affected.

The various members of the party met in the evening and enjoyed the hospitality of the medical superintendent and discussed their day's outing. Those interested in Filariasis made a series of blood film examinations of hospital patients about midnight.

September 19th. On the following morning it was decided to again divide forces. The helminthologist and entomologist desired to continue further collecting in other areas and planned to return by bus via Hangchow and thence to Shanghai by rail. The French scientist desired to see as much of the country side as possible so



INSECTARY BUILT OVER CREEK



FIELD TRAP FOR ADULT MOSQUITOES

he accompanied the Head of the Division in his motor launch on the return journey to Kashing and thence to Shanghai. A start was made about 6 a.m. A guide having been secured from the hospital, we proceeded by the chain of lakes south of Huchow to take a route in the direction of Lingwu and aimed at joining the Grand Canal some 20 miles south of Kashing. The waterways in Chekiang at this time of year were deep and easily navigated. However it requires a very intimate knowledge of the routes especially of the heights of the bridges to be certain of taking the best course; otherwise one might literally steer by compass so intimately is the land intersected by water. The enthusiasm of the distinguished scientist for taking photographs from the roof of the launch had to be curbed on several occasions especially as we approached low bridges across the creek otherwise there was a distinct danger of him losing his head. The wash of the motor boat caused the various people who were collecting ling which grows everywhere along the creek margins to bob up and down in the peculiar little round or oval tubs which they use whilst gathering the fruit. The areas of ling are enclosed by a rope attached to bamboo poles from the navigable parts of the creek. At Kashing which was reached in the early afternoon a further expedition was made to the Schistosomiasis areas this time by sampan. Various types of snails other than *Oncomelania* were collected for the visiting professor. We also noted the places which were most likely to have soil contaminated by hookworm larvæ. We made further collections of mosquito larvæ in lotus pools which at this season exhibited the beautiful flower at its very best.

These somewhat disjointed and scrappy extracts from a note book are given with the object of attempting to reconstruct some of the atmosphere surrounding the type of collecting trip which is undertaken from time to time. This may be of interest to those unfamiliar with this part of China. It has however to be emphasized that the most fruitful field work is connected with systematic and periodic study of some specific detail in a particular area. The approach to each problem differs in detail. For instance in Cholera investigations, many field observations are only remotely connected with medical research but the water factor previously mentioned is of prime importance. In Relapsing Fever investigations, one has the vector, the human louse and all its associations with poverty, dirt and human misery to consider.

This general review of one or two of the aspects and underlying principles which govern Field Research is given as an introduction

to the Annual Report and may be read in conjunction with the details reported therein. Those interested in any of the particular problems mentioned may obtain fuller information in the various papers published from time to time by members of the staff, the titles of which appear in the Appendix.





COLLECTING BIOLOGICAL SPECIMENS



COLLECTING LICE FOR RESEARCH

## THE DEPARTMENT OF EPIDEMIOLOGY AND MEDICAL STATISTICS

The resignation of Dr. Gear has necessitated a re-definition of the scope of this Department. It was originally intended that the department should advise the Director with reference to the organization of research in preventive medicine which was not specifically cared for by the divisions, and that it should be under the control of a specialist in public health work assisted by a statistician. On this basis the work of the first three years has been mainly devoted to an attempt to assess the relative incidence of disease in hospital populations, but owing to financial stringency it has not been possible to appoint a successor to Dr. Gear.

It was also recognized that the statistician might be called upon to provide a statistical service for the analysis of data obtained by other workers in the institute and the department is now entering on this second phase of its activities under the guidance of Mr. E. A. G. Shrimpton to whom I am indebted for the following report. During the greater part of the year the department has been busy completing the work of the general hospital survey and carrying on the work of the special surveys as outlined in previous reports, while Dr. Gear has been continuing his analysis of the data collected during the period of his appointment at the Institute. In December Mr. H. B. Wong was transferred to the health service of the Shanghai Municipal Council.

### (1) CHINESE MEDICAL ASSOCIATION HOSPITAL SURVEY

#### (a) *General*

During a large part of the year under review, the department was concerned with the analysis of in-patient and out-patient records provided by the hospitals co-operating in the Chinese Medical Association Hospital Survey. In the year 1933, 17 hospitals were able to submit complete records, and 11 hospitals incomplete records. The latter for the most part supplying in-patient records only. In 1934 the corresponding figures were 25 and 4 hospitals respectively. The total number of complete records available was 208,045 in 1933, and 268,684 in 1934.



Monthly and annual summaries were sent to the hospitals concerned, and the data was summarized and analysed by sex, age, seasonal and geographical distribution. The results have been reported by Dr. H. S. Gear in a paper entitled "Disease Incidence in China, an Analysis of Hospital Records for 1934." In this report Dr. Gear states that the chief disease groups in hospital populations for the year 1934 in order of importance were:—

- (1) Diseases of the Skin and Cellular Tissues.
- (2) Conditions of Violence.
- (3) Other Diseases of the Digestive System.
- (4) Venereal Diseases.
- (5) Other Diseases of the Eye.
- (6) Miscellaneous Conditions.
- (7) Tuberculosis.
- (8) Trachoma.
- (9) Other Diseases of the Genito-Urinary System.

These findings were in accord with those obtained in 1933, although the disease order in some cases was different.

*(b) Special Studies*

Detailed analyses of the data have been made for numerous conditions, some of these have already been published and were reported in the previous year. During the current year, two further reports have been published.

*Malaria*

Dr. H. S. Gear, in a paper entitled "A Note on Malaria in China" found that Malaria is one of the major causes of morbidity amongst hospital patients in 1934. All types were found scattered throughout the regions studied, benign tertian malaria being the most frequent type.

*Relapsing Fever*

Mr. E. A. G. Shrimpton, in a paper "A Survey of the Incidence of Relapsing Fever in China," utilized the data obtained in the survey, from hospital reports, and other references in the literature. He found that the disease was reported in varying frequency from the majority of provinces in China; that minor epidemics occurred in certain localities; these epidemic areas showing marked seasonal distribution. The occupational incidence showed that the disease

is almost entirely confined to the lower strata of society. The sex incidence, age distribution and other epidemiological factors were in accord with the findings of other writers elsewhere.

H. S. Gear :

- (1) "Disease Incidence in China, an Analysis of Hospital Records for 1934." *Chinese M.J.* (in the press).
- (2) "A Note on Malaria in China." *Chinese M.J.*, 1936, 50, pp. 131-136.

E. A. G. Shrimpton :

- (3) "A Survey of the Incidence of Relapsing Fever in China." *Pathology & Microbiology Supp. of the Chinese M.J.*, 1936, pp. 312-344.

## (2) INDUSTRIAL AND OCCUPATIONAL HYGIENE

Dr. Gear, in a previous report, detailed the work he was doing in an investigation of factory conditions in the printing trade, he has now published a report entitled "An Investigation of Printing Works," in which he summarizes the following main conclusions :—

The factory conditions were bad. Converted houses were used with bad lighting, bad ventilation and dirty conditions generally, in which the employees worked, ate and slept. Over 78 per cent. of the employees were under 25 years of age; 63 per cent. had had under five years service in the printing industry, and over 79 per cent. were from outside country districts, recruited chiefly through the vicious contract system.

The employees showed two sets of disease conditions : (a) those which are also common in the general population such as a high incidence of trachoma, otitis media, dental caries and pyorrhoea, skin conditions and tuberculosis; (b) those which may be considered hazards of the Chinese printing industries, lead poisoning (10 per cent. of employees) rhinitis, conjunctivitis and injuries.

The chief results of this pioneer investigation are : (a) that it shows the feasibility of carrying out industrial health investigations in China, and (b) that industrial hygiene is non-existent and almost hopeless of attainment in the absence of a government regulation of industry.

It is unfortunate that at the moment the department will be unable to continue these investigations, but an investigation by Dr. Read and others into the Chromium Plating Industry has been made

along somewhat similar lines. It is hoped that by co-operation between the various departments of the Institute these investigations may be continued and their scope enlarged.

H. S. Gear, T. Y. Li, Y. B. Dju and J. Gear :

- (1) "Industrial Health in Shanghai, China. An Investigation of Printing Works." *Chinese Medical Association, Special Report Series*, No. 4, 1935.

### (3) STATISTICAL SERVICE

As mentioned above, the scope of the department has largely been re-defined to provide a statistical service for the Institute. Assistance has already been given to various research workers, in particular an analysis of Dr. Platt's data, on the relation between vitamin B<sub>1</sub>, deficiency and the amounts of bisulphite binding substances in the blood has resulted in the publication of a statistical note now in the press. The utility of statistical methods has been further demonstrated in showing the variations in the growth curves of the factory workers in the chromium plating industry. A preliminary note on this subject was incorporated in a report by Dr. B. E. Read. It is gratifying to record that research workers are taking more and more advantage of the services provided and are handing over their data for more critical analysis by approved methods. The department is at present engaged upon an analysis of data supplied by Drs. Platt and Gin, on infant growth in Shanghai with a view to establishing a standard upon which clinical investigation can be based.

### (4) SPECIAL SURVEYS

During 1935 Dr. Maxwell continued to act as Chairman of the Research Council of the Chinese Medical Association the position he had held at its inauguration in the early years of the century and has carried on the special surveys which were proposed at the Nanking Conference in order that a more detailed knowledge might be obtained with reference to certain diseases and as far as the Institute is concerned in regard to those problems receiving special attention in the laboratories at Avenue Road and in the wards of the Clinical Unit at the Lester Hospital. The response to these investigations has naturally been uneven, being dependent upon the nature of the enquiry but as far as preliminary analyses go, the best response has been for malaria, dental caries, dick test, and leprosy. At the Canton Meeting of the C. M. A. in November 1935, it was decided to close down these special surveys at the end of June 1936

and to devote the rest of the biennium to the organization of a nutrition survey under the chairmanship of Professor Read.

Dr. Maxwell has himself devoted much attention to leprosy. He reports that "with few exceptions the hospitals handling lepers have been very co-operative and already about 700 cards have been received. The results of analysis of these returns have been most interesting but to get any really satisfactory results I consider that we ought not to have less than 2,000 returns. I am still pushing this line of investigation and hope eventually to secure this total. On the whole, as far as one can see at present, the final analysis will agree in most points with the results of similar series in other countries though certain interesting points of difference seem likely to emerge. How far the same types of leprosy are found predominating in different parts of the country, is a point of considerable interest which I hope will be brought out before the close of this investigation.

"Among interesting additions to our knowledge of the distribution of leprosy is the increasing evidence of the enormous incidence of the disease in northern Shantung, apparently a local incidence much higher than in the more generally infected southern provinces. I am hoping that I may have the opportunity of paying a visit to this region and satisfying myself that these reports are substantially correct.

"On the invitation of Marshal Chen Chi-tang and the Commissioner of Health in Canton, I spent some weeks after the Canton Conference in visiting leprosy centres. Their desire had been for a fuller investigation of the incidence of leprosy in some of the counties of Kwangtung. Conditions, particularly the lack of any trained staff and of time, made this impossible, but a number of visits were paid to different centres and a report was sent in to the Health Commissioner. It is possible that there may be further developments along this line.

"Meetings of a Section on Leprosy to which I was appointed Chairman were held during the Canton Conference."

Dr. Maxwell is also continuing his collection of statistics of disease from hospital reports, so that a modified general survey is still being maintained.

J. L. Maxwell :

- (1) "The Treatment of Leprosy from a Public Health Point of View." *Chinese M.J.*, 1935, 49, pp. 313-324
- (2) "Leprosaria and Organized Leprosy Clinics." *Chinese M.J.*, 1935, 49, pp. 957-962

## LIBRARY

Dr. Maxwell has continued to act as Librarian with the assistance of Mr. Edmund Chen as Library Assistant. Mr. Chen spent three months in Peiping during the early part of 1935 studying the methods employed in the Peiping libraries and more particularly in the medical library of the P. U. M. C. We are indebted to all those who offered him facilities for study and gave him the benefit of their experience. Various improvements have been introduced in our own library since Mr. Chen's return. These include (1) the arrangement of journals (previously arranged in subjects) in alphabetical order of titles, (2) the preparation of a card index of medical journals available in other medical libraries in Shanghai, (3) the preparation of a catalogue of miscellaneous reports of conferences, annual reports of institutions and government departments, while (4) work has also been begun on an author catalogue of books, available in Shanghai medical libraries. Details in regard to additions to the library and other matters of a statistical nature are given in an appendix, but the special gratitude of the institute is due to the following institutions and persons, among others, for presentations to the Library: American Society of Tropical Medicine; Amoy University; Aurora University; Bureau for Increasing the Use of Quinine, Amsterdam; Calcutta School of Tropical Medicine; China Foundation for the Promotion of Education; Chinese Society of Pathology and Microbiology; Far Eastern Association of Tropical Medicine; French Municipal Council, Shanghai; Hongkong Government Medical Department; Hongkong University; Indian Research Fund Association, Scientific Advisory Board; Kuala Lumpur Institute for Medical Research; University College, London, Department of Physiology and Biochemistry; Marine Biological Society of China; Medical Research Society of China, Shanghai; Milbank Memorial Fund, New York; National Health Administration and Central Field Health Station, China; National Quarantine Service, China; National University of Peking; Neurological Institute of New York; New York State Department of Health, Division of Laboratory and Research; North Borneo Medical Department; Pasteur Institute, Indo-China; Pasteur Institute, Paris; Peiping Health Station; Peiping Union Medical College; Rockefeller Foundation, International Health Division; Rockefeller Institute for Medical Research; Royal College of Surgeons,



England; Shanghai City Government Bureau of Public Health; Shanghai Municipal Council, Public Health Department; Singapore Medical Department; Smithsonian Institution, Washington; South African Institute for Medical Research, Suva Medical Department; Tokyo Imperial University, Japan; Toronto University; University of California; West China Union University; Yen Ching University, Peiping; Prof. E. Brumpt, Drs. H. G. Earle, S. M. K. Hu, J. L. Maxwell, B. E. Read, R. C. Robertson, F. F. Tang; Messrs. Ed. H. T. Chen, R. V. Dent, E. A. G. Shrimpton; Major P. G. Edge.

It will be noted from the figures given in the appendix that the library is expanding in all directions. The figure for visitors in 1934 was abnormally high owing to Conference visitors. Special attention may be drawn to the fact that the number of bound volumes of journals is increasing more rapidly than the number of books; journals must always be more valuable to the research worker than books, and it is not the purpose of the Institute to develop a medical school library. Further, the attention of practitioners may be drawn to the fact that a departmental library is maintained in the Clinical Unit at the Lester Chinese Hospital.

## DIVISION OF CLINICAL RESEARCH AND EXPERIMENTAL SURGERY

DR. H. GORDON THOMPSON

The work in this section of the Institute's activities has continued steadily throughout the year. It consists of bedside and clinical laboratory observations in the Research Unit, situated on the Fifth floor of the Lester Chinese Hospital, and Experimental Surgery in the laboratories and operating suite at the Institute in Avenue Road.

There are two principal difficulties which arise in carrying out observations upon patients which do not apply to experimental work such as is done in connection with animal investigation. In the first place the well-being and progress of the patient towards renewed health has always to be the chief consideration, and secondly, it is impossible to entirely control the patient because economic or family reasons may necessitate his leaving hospital as soon as his urgent symptoms are alleviated and frequently before the investigation of his morbid condition is completed. However, tact and patience have constantly been successful in bringing about a measure of co-operation on the part of the patient who, when he realizes that the various tests applied are part of a scheme to find the cause and bring about a cure of his disease, is not only willing but anxious to have them repeated, and will frequently agree to remain or return for observation when the acuteness of his disease has passed away.

### *Staff Changes*

During the year under review there have been several changes in the Staff. Dr. T. Y. Li, on the completion of his Fellowship, has returned to Hongkong. Dr. P. T. Wu has joined the Surgical Department of the P.U.M.C., and Dr. Y. C. Yieh has gone to the Liverpool University as the holder of a Holt travelling fellowship. Dr. Y. N. Liu has been appointed House Surgeon and Scholar in Surgery, and Mr. T. H. Li is doing his internship under Dr. Platt in the wards of the Clinical Unit. Dr. S. Y. Gin is leaving shortly to take up a post at Changchow in Children's diseases and Infant welfare work.



DEPARTMENT OF MEDICINE

*Deficiency Diseases*

Since the last report, which dealt mainly with preliminary investigation, considerable progress has been made in the study of the disordered nutrition as seen in the beri-beri syndrome and in the investigation of the diet of the Chinese infant and child. The conclusions arrived at may be summarized as follows :

Vitamin B<sub>1</sub> deficiency may be seen in various grades of severity in the clinical syndrome of "beri-beri," in its purest form in the severe fulminating type and probably in infantile cases.

Chemical changes, in vitamin B<sub>1</sub> deficiency, occur in the blood, urine and cerebro-spinal fluid. One of these changes investigated is the accumulation of carbonyl compounds, especially of pyruvic acid. The amount of these substances present in the blood, as determined by the bisulphite binding capacity, follows the degree of vitamin B<sub>1</sub> deficiency as determined by clinical criteria. This appears to hold good for comparison of different cases as well as for the course of remission in any one case. The presence of pyruvic acid as shown by chemical tests has been fully confirmed by isolation from the blood of the 2-4 dinitrophenyl-hydrazone of pyruvic acid in several cases in sufficient amount to allow melting point determination and quantitative analyses to be carried out. Methyl glyoxal has also been found in some instances. It appears from our more recent work that urine examination for pyruvic acid may lead to early diagnosis of vitamin B<sub>1</sub> deficiency.

The accumulation of these carbonyl compounds may throw considerable light on the mechanism of the changes consequent on B<sub>1</sub> avitaminosis and their relationship to clinical manifestations.

It has been found that a lowering of the blood level for bisulphite binding substances follows the administration of vitamin B<sub>1</sub> concentrates. There are indications from the work already carried out that enormous doses of vitamin B<sub>1</sub> are required for effective treatment in the more severe grades of vitamin B<sub>1</sub> lack. It is suggested that the aberration of the amount of pyruvic acid in the blood may form a basis for estimating the potency of vitamin B<sub>1</sub> preparations.

The evidence obtained so far indicates that the estimation of the bisulphite binding substances and/or pyruvic acid may be used in the study of diseases modified by associated B<sub>1</sub> hypovitaminosis and in those, such as epidemic dropsy, believed by some authorities to be due to B<sub>1</sub> avitaminosis.

This work provides the basis also for a study of the "toxæmia" of beri-beri, in the past suspected to be exogenous but now we have evidence of its endogenous origin.

There are clinical findings common to most of the so-called beri-beri cases which, however, are not seen in the purer forms of vitamin B<sub>1</sub> deficiency.

A number of the manifestations of vitamin A deficiency were described in a paper quoted in the last report. These have been further studied. Unusually good examples of the more severe forms of the skin manifestations of vitamin deficiency have been investigated with respect to their histopathology and response to treatment with vitamin A concentrates.

Vitamin C is required in large amounts for saturation of the patient suffering from mild "beri-beri." The amounts of available vitamin C in foodstuffs as ordinarily consumed are being determined by substitution of these for pure 1-ascorbic acid in saturated subjects and measuring the associated urinary excretion.

B. S. Platt and G. D. Lu :

"Intermediate Carbohydrate Metabolism in Vitamin B<sub>1</sub> Deficiency in Man." *Proc. 3rd General Conference (Physiol. Sect.) Chinese Medical Association*, Canton, Nov. 1935, p.16.

B. S. Platt and E. F. Yang :

"The Supply and Excretion of Vitamin C in Man." *Proc. 3rd General Conference (Physiol. Sect.) Chinese Medical Association*, Canton, Nov. 1935, p.18.

### *Infant Nutrition*

This study is proceeding along three main lines :

- (a) A survey of native methods.
- (b) A critical examination of these in the ward with the aid of laboratory methods.
- (c) The application of the findings in general practice in a typical community.

The first phase of the work has been pursued by taking histories from mothers from different parts of China now living in Shanghai. The results of this survey show an extensive use by the Chinese of rice products as supplementary and complementary feeds. Red dates are also widely used. Duration of breast feeding, management of wet nursing, nature of weaning diets and the food of the young child have been studied in this survey. Physical measurements and estimates of nutrition have been obtained from a large series of normal infants. These data are now being analysed.

Weaning diets have been devised and are being tested out by following the growth and general development of the infant.

B. S. Platt :

"An Approach to the Problems of Infant and Child Nutrition in China."  
*Chinese M. J.*, 1936, 50, pp. 410-424.

Rice is of importance, in relation to the study of deficiency disease especially beri-beri, as well as in infant feeding in China and has been studied concurrently with the foregoing investigations. Chemical analyses have confirmed the low figures given by most authorities for the cellulose and hemicellulose fraction of rice carbohydrates. Attention is however directed to the disposition of these substances in relation to digestion and availability of the nutrients of the rice grain.

In young children the absorption of carbohydrate is being followed by blood sugar determinations correlated with emptying times of the stomach determined radiologically. Preliminary results tend to support the view attained from other considerations that the best results to be obtained from rice economically and biologically will be by using unmilled or lightly milled rice in powder form.

E. F. Yang, G. D. Lu and B. S. Platt :

"Studies on Rice. (1) Introductory." *Proc. 3rd General Conference (Physiol. Sect.) Chinese Medical Association*, Canton, Nov. 1935, p.26.

### *General developments*

The general trend, however, is for the results of work done in the laboratory and experimental ward to be referred to the actual conditions under which the subjects are living.

This reference may be divided into three main heads in relation to our present activities.

- (1) The third phase of the infant nutrition research [see above (c)].
- (2) The study of the environment of the patients comprising the greater portion of the so-called "beri-beri" cases, i.e. the artisans. This is in keeping with the original research programme, put forward in April 1933.
- (3) The application of the findings as well as the study of further problems in samples representative of the masses of the population, i.e. the residents in rural areas.

DEPARTMENT OF CLINICAL AND EXPERIMENTAL SURGERY

*Gastro-intestinal disorders*

Further work has been done by Dr. Gordon Thompson clinically upon the incidence of appendicitis among the Chinese, and experimentally upon the functions of the cecum and vermiform appendix and the effects of variation of diet upon the lymphoid tissue in the alimentary tract. These observations are being continued.

In association with Dr. P. T. Wu twenty-five cases of gastric and duodenal ulcer have been admitted to the wards for operation or observation, and further experimental work upon the causation of Peptic ulcer has been carried out at the Institute and submitted for publication.

*Urological Diseases*

Additional work has been done by Dr. John Gray on infection and stone formation in the urinary tract and 67 cases have been admitted to beds in the Clinical Unit for purposes of investigation. It was found that tuberculosis of the kidney is more common than was previously believed to be the case.

The effects of obstruction of the ureter was investigated on experimental animals and it was found that in both cases a marked effect is produced upon the blood supply, the renal tubules and the pelvic epithelium. Moreover, if the animals were in addition kept upon a diet which had been found likely to give rise to stone formation—partial obstruction of the ureter more frequently gives rise to stone formation than where the obstruction is complete.

Additional experimental work upon the effect of reduction of the blood supply of the kidney showed that this was frequently followed by stone formation and that when this was combined with a suitable dietetic factor, causing an excess of calcium and a diminution of phosphates in the urine, the incidence of stones found was three times as great.

J. Gray :

"The Effects of Obstruction of the Urinary Tract with Particular Relation to the Formation of Stones." *British Journal of Surgery*, 1935, 23, pp. 451-457.

J. Gray :

"The Effect of Experimental Interference with the Blood Supply of the Kidneys." *British Journal of Surgery*, 1935, 23, pp. 458-468.

J. Gray :

"Suprapubic Drainage of the Bladder, its Indications and Contraindications." *Chinese M. J.*, 1935, 49, pp. 537-541.

## THE DIVISION OF PHYSIOLOGICAL SCIENCES

PROFESSOR BERNARD E. READ

The work of this Division during 1935 has been chiefly concentrated upon problems in the field of nutrition. The excellent nutritional programme originally drawn up by the late Dr. Eric Reid included studies of, (a) the inorganic constituents of Chinese foods, (b) the organic proximate principles for their caloric values, (c) vitamin contents, (d) specific foodstuffs for their comparative biological value, (e) Chinese dietary surveys. Work upon each section of this programme has been continued on an intensive basis, and much valuable data has been obtained, with which it has been possible to evaluate Chinese diets in Central China.

The present world-wide interest in nutrition, the broader physiological viewpoint developing in medicine, and the helpful international nutritional standards laid down by the League of Nations all lend emphasis to the need for work upon this subject in China where conditions are so different from those in European countries. The Chinese Medical Association in recognizing this need has appointed its new Research Council with Nutrition as its programme. With the object of co-operating as far as possible with such projects we are not only securing the necessary analytical data, we are studying various fundamental aspects of nutrition as they are related to the Far East and indirectly to the subject as a whole.

### CHINESE DIETS

Mr W. Y. Lee has continued his earlier surveys extending his observations to the local factories. With the kind co-operation of Miss E. M. Hinder of the Industrial Section of the Shanghai Municipal Council it has been possible to secure an open door for dietary investigations in two groups of factories. The first group of seven factories of varying occupations, was compared with the earlier surveys made upon institutional diets. The second group was composed of 281 persons in eight chromium plating factories. With the co-operation of Miss Dju of the S.M.C. independent clinical and physical examination of the workers in group two was made, and in general confirm the results obtained by Dr. H. S. Gear in his



investigation of conditions in the local printing establishments. The diets were extremely poor, the health of the very young worker is given no consideration, and disease and industrial hazards have full scope in producing human wreckage. This in general was discussed at greater length in last year's report from the Directorate.

Dr. Eric Reid continued his studies upon soybean-egg milk powder, showing the calcium and phosphorus retention in rats and the nitrogen retention and digestibility is greater than that of whole milk powder. Further feeding experiments with this preparation showed that the percentage of ash in the bones of rats was normal, the hæmoglobin-building properties were adequate, and the growth response was superior to whole milk powder, with or without iron.

E. Reid :

"The Nutritive Properties of Soybean-egg Powder, a Substitute for Cow's Milk in Infant Dietary." *Chinese Journal of Physiology*, 1935, 9, pp. 27-42.

E. Reid :

"The Calcium, Phosphorus, and Nitrogen Retention of Rats on Soybean-egg Powder and Whole Milk Powder Diets." *Chinese Journal of Physiology*, 1935, 9, pp. 307-314. Also *Proc. 8th Annual Meet. Chinese Physiol. Soc. Peiping*, 1935, p. 28.

W. Y. Lee :

"Dietary Surveys in Shanghai." *Proc. 3rd General Conference (Physiol. Section) Chinese Medical Association*, Canton, Nov. 1935, p. 11.

## VITAMINS

Dietary surveys have necessitated much bibliographic research into the records of neighbouring countries and elsewhere in the world for particulars concerning the vitamin content of oriental foodstuffs. Such reviews have been summarized by Dr. H. C. Hou in "Nutrition Notes," and are serving as a guide to workers in this field.

Where there is a lack of specific information we have often been able to find comparative data of similar species, and for practical purposes we have turned to the quick estimations by chemical or physico-chemical tests of vitamins A and C. The earlier titrations of Dr. Y. F. Chi of 120 Chinese foods and drugs have been in numerous cases checked by biological assay. The Canton orange was found to be slightly superior to the Sunkist orange in its vitamin C content, but the Wenchow orange was decidedly inferior. The close correlation of the results of the chemical and biological methods of assay for citrus fruits was confirmed and subsequently nearly 30

kinds of oranges examined by the chemical method. Chinese amaranth, one of the cheaper vegetables tasting like spinach, is unusually rich in vitamin C though Dr. Hou found that it is not fully utilized by the organism; biologically it is as active as orange juice, chemically it has twice as great a value. A further study of six vegetables shows that there is some interfering substance or substances hindering the absorption of vitamin C from some foods.

Dr. H. C. Hou has continued further his studies upon the interrelationship of vitamins and other dietary constituents. The formation of urinary calculi by feeding diets low in vitamin A and high in vitamin D, has been shown to be also true when the vitamin D is given in moderate amount with a high protein diet. These studies are being continued with observations of the effect of varying amounts of calcium, phosphorus, lard and protein in the diet.

Other studies in the vitamin field deal with the mode of administration, and the contents of the organs of animals on deficient diets. These and other findings have arisen out of our main problems. A modification of Sherman and Smith's vitamin A deficient ration for rats has been made, substituting soybean protein for casein and potato starch for corn starch. The soybean protein showed a somewhat shorter depletion period and the potato starch the shortest depletion period and the best gain in body weight.

Biological assays for vitamin A were made upon fresh and dried capsicums. However there was such urgent need for some basis of evaluation of the vitamin A content of Chinese materials, that Dr. Peter Mar took up the problem, and examined over 100 substances by the chemical and spectrographic tests. Of the 148 substances recommended in ancient Chinese medicine for night-blindness quite a number were found to give very high colour values, indicating the probable presence of vitamin A or its precursors. These will have to be confirmed by biological assay before any definite meaning can be put upon these results which suggest unusually rich sources of this vitamin.

H. C. Hou :

"Vitamin A in Nutrition in China." *Nutrition Notes*, May 1935.

H. C. Hou :

"Vitamins B<sub>1</sub> and B<sub>2</sub> in Nutrition in China." *Nutrition Notes*, October 1935.

H. C. Hou :

"Vitamin D in Nutrition in China." *Nutrition Notes*, June 1935.

Henry Lester Institute of Medical Research

Y. F. Chi and B. E. Read :

"The Vitamin C Content of Chinese Foods and Drugs." *Chinese Journal of Physiology*, 1935, 9, pp. 47-62.

H. C. Hou :

"Some Differences in the Values obtained by the Chemical and Biological Assays of Vitamin C in Certain Foods." *Chinese Journal of Physiology*, 1935, 9, pp. 291-298. Also *Proc. 8th Annual Meet. Chinese Physiol. Soc.* Peiping, 1935, pp. 16-17.

H. C. Hou :

"Further Studies on the Chemical and Biological Assays of Vitamin C." *Proc. 3rd General Conference (Physiol. Section) Chinese Med. Assn.*, Canton, Nov. 1935, p. 9.

H. C. Hou :

"A Comparative Study of the Vitamin C Content of Several Varieties of Chinese Oranges." *Chinese Journal of Physiology*, 1935, 9, pp. 223-244.

H. C. Hou :

"The Variation of Vitamin C Content in Certain Fruits and Vegetables." *Proc. 3rd General Conference (Physiol. Section) Chinese Med. Assn.*, Nov. 1935, p. 9.

H. C. Hou :

"The Vitamin C Content of Two Varieties of Chinese Amaranth, Hsien Ts'ai." *Chinese Journal of Physiology*, 1935, 9, pp. 253-260.

H. C. Hou :

"Comparison of Oral and Subcutaneous Administration of Protective Doses of Ascorbic Acid (Vitamin C). *Proc. Soc. Exp. Biol. & Med.* 1935, 32, pp. 1391-1392. Also *Proc. 8th Annual Meet. Chinese Physiol. Soc.*, Peiping, 1935, pp. 14-15.

H. C. Hou :

"The Relation between the Antiscorbutic Activity and the Mode of Administration of Ascorbic Acid. *Proc. 3rd General Conference (Physiol. Section) Chinese Medical Association*, Canton, Nov. 1935, p. 8.

H. C. Hou :

"The Ascorbic Acid Content of Certain Organs of Chicks Raised on Vitamin C Deficient Ration." *Science* 1935, 82, p. 423.

H. C. Hou :

"A Modification of Sherman and Smith's Vitamin A Deficient Ration for Rats." *Chinese Journal of Physiology*, 1935, 9, pp. 197-206.

H. C. Hou :

"Studies on the Interrelationship of Vitamins and other Dietary Constituents. I. Vitamins A and D and other Dietary Constituents in Relation to the Formation of Urinary Calculi." *Chinese Journal of Physiology*, 1935, 9, pp. 299-306. Also *Proc. 8th Annual Meet. Chinese Physiol. Soc.*, Peiping, 1935, pp. 15-16.

H. C. Hou :

"The Effect of Varying the Quantities of Vitamins A and D and other Dietary Constituents on the Albino Rat." *Summary of Communication, the 15th International Physiological Congress, Leningrad, Moscow, Aug. 1935*, pp. 161-162.

P. G. Mar and B. E. Read :

"Chemical Examination of Chinese Remedies for Night-blindness." *Proc. 3rd General Conference (Physiol. Section) Chinese Medical Association, Canton, Nov. 1935*, p. 13.

#### SUGAR METABOLISM

Dr. C. Tsai assisted by Dr. C. L. Yi, research scholar in the division during the first half of the year, continued their researches upon the carbohydrate metabolism of the liver. From the previous year's work it was found that the glycogen content of the liver, its sugar output and the blood sugar level were greatly influenced by the anesthetic used. Dr. Tsai elaborated a satisfactory technique for studying this problem under normal conditions, and has now found that the normal intact cat after the administration of glucose shows a storage of sugar in the form of glycogen by the liver and muscles much higher than in control animals, the muscles taking up about twice as much as the liver.

The estimation of the glycogen of the liver has been a matter of prolonged study, with the definite recognition of a combined fraction. This part of the glycogen is being intensively studied with findings of considerable interest to be published in the near future. The work done reveals other important aspects of the subject, particularly the fact that there are non-carbohydrate sources of sugar which the liver is able to utilize.

C. Tsai :

"An Improved Method of Angiostomy." *Chinese J. Physiology*, 1935, 9, pp. 355-362. Also *Proc. 8th Ann. Meet. Chinese Physiol. Soc., Peiping, 1935*, p. 3 Demonstration.

C. Tsai and C. L. Yi :

"Sugar Output and Intake of the Liver in the Normal Intact Cat." *Proc. 8th Annual Meet. Chinese Physiol. Soc., Peiping, 1935*, p. 32.

C. Tsai :

"Constancy of Internal Environment in the Human Body" (in Chinese). *Science*, 1935, 19, pp. 227-237.

#### NUTRITIVE PROPERTIES OF GELATIN

Dr. T. G. Ni three years ago started a pharmacological study of Chinese glue known as "Ah-chiao." Its great similarity to

ordinary gelatin, and its high content of glycine has led to parallel studies of these three substances with strikingly similar results in some of the experiments. The previous reports upon improved calcium and nitrogen retention, and the use of ah-chiao for the treatment of hæmorrhage and shock, which have been more completely dealt with in this year's publications, have now been followed by work upon experimental muscular dystrophy.

Pappenheimer and Goetsch accidentally found that their diet No. 11 caused muscular dystrophy in guinea-pigs, another diet was found to cause muscular dystrophy in young ducks and also to produce lesions in the central nervous system of chickens. Dr. T. G. Ni first made a study of the creatine metabolism in the nutritional muscular dystrophy caused by diet 11, and found that the conditions were similar to the progressive muscular dystrophy of human patients reported by various workers. In view of the fact that ah-chiao was used in ancient medicine for muscular weakness Dr. Ni tried out the effect of the simple addition of this substance to diet 11. It is also of note that in the clinical treatment of muscular dystrophy glycine, a substance present in gelatine over 20 per cent, has been found very effective for many cases. It was found that the addition of ah-chiao to the diet prevented the development of experimental muscular dystrophy in guinea-pigs, and those animals fed on diet 11 which had fully developed symptoms in the majority of cases were successfully cured by the giving of ah-chiao. This was confirmed by careful histological studies of the tissues. The general picture suggests that conditions resulting from a deficiency of the aliphatic amino acids in the diet can be dealt with by the administration of such substances as gelatin.

T. G. Ni:

"The Composition and Action upon Calcium Metabolism of Ah-chiao (donkey-skin glue) and Commercial Gelatin." *Chinese Journal of Physiology*, 1935, 9, pp. 329-338.

T. G. Ni:

"Note on the Hematopoietic Action of Ah-chiao (donkey-skin glue)" *Chinese Journal of Physiology*, 1935, 9, pp. 383-394. Also *Proc. 8th Annual Meet. Chinese Physiol. Soc.*, Peiping, 1935, p. 27.

T. G. Ni:

"The Creatine and Creatinine Excretion and the Creatine Content of Muscle in Nutritional Muscular Dystrophy." *Proc. 3rd General Conference (Physiol. Section) Chinese Medical Association*, Canton, 1935, p. 14.

T. G. Ni:

"The Effect of Donkey-skin Glue upon Nutritional Progressive Muscular Dystrophy." *Proc. 3rd General Conference (Physiol. Section). Chinese Medical Association*, Canton, 1935, p. 15.



PHARMACOLOGY

*Ephedrine*

The work upon the quaternary compounds was reported upon last year, its publication is now to hand and reprints are available to those interested in this problem.

The physical properties of ephedrine have lacked attention. The highly unstable character of the alkaloid when it is subjected to tropical temperatures led us to examine the pure alkaloid and its hemi-hydrate. The latter is the form commonly found upon the market, but it has a melting point lower than the pure alkaloid and dissolves in liquid paraffin only by the aid of heat. It was found that ephedrine when freely exposed to the air is volatile, and when heated to temperatures somewhat above boiling water quickly disappears.

C. Pak and B. E. Read :

"The Action of Ephedrine Quaternary Halide Compounds." *Chinese Journal of Physiology*, 1935, 9, pp. 1-16.

B. E. Read :

"Some Properties of Ephedrine Alkaloid." *Proc. 3rd General Conference (Physiol. Section) Chinese Medical Association*, Canton, Nov. 1935, p. 19.

*Propyl-guaiacol*

A new anthelmintic, propyl-guaiacol made by Dr. Pyman, was tried out for its effect upon dogs and cats. It was found to be an active anthelmintic for ascaris but it has no effect on tape worms, hook worms or flukes. It was comparatively toxic to the host especially in cats, it is readily absorbed producing marked depression of the central nervous system and circulation.

C. Pak and B. E. Read :

"The Anthelmintic Properties of Propyl-guaiacol." *Proc. 3rd General Conference (Physiol. Section) Chinese Medical Association*, Canton, Nov. 1935, p. 15.

*Pyrimidines*

Dr. Y. F. Chi, with Mr. Y. L. T'ien, scholar of the China Foundation in 1934, continued his well-known researches upon the pyrimidines in our laboratories and prepared the isomeric form of one of his compounds. Later at the Academia Sinica a new compound was synthesized which was similar in constitution to the well-known antipyretic antipyrine. Dr. Chi supplied us with enough of this new compound for Dr. C. L. Yi to conduct a preliminary study

of its physiological action. He found it to be more potent and more rapid in its action than antipyrine.

Y. F. Chi and Y. L. T'ien :

"Researches on Pyrimidines. The Molecular Rearrangement of 2-ethyl-mercapto-5-ethyl-6-thiocyanopyrimidine." *Journal of American Chemical Society*, 1935, 57, pp. 215-217.

C. L. Yi and B. E. Read :

"The Antipyretic Action of a New Antipyrine Derivative." *Chinese Journal of Physiology* 1936, 10, pp. 297-302.

### Fluorine

Dr. E. Reid with the assistance of Mr. R. G. Cheng has taken up the local aspects of fluorine toxicosis. The soil of this province in certain areas is unusually rich in fluorine, and it seemed highly probable that foodstuffs grown here might be deleterious, causing mottled enamel and other symptoms of fluorine intoxication. Various food materials were analysed and the cheaper brands of tea found to contain a relatively large amount of fluorine most of which is extracted in a 2 per cent infusion. The toxic effects were fully demonstrated by feeding experiments upon rats. There was little evidence that plants assimilate more fluorine from soils rich in fluorine. Where such was found to be the case alternative explanations were possible.

Extensive fundamental studies upon fluorine with regard to absorption, retention and excretion and its effect on the teeth, bones and glands have been made, which after careful analysis and interpretation will be reported in the future.

E. Reid :

"The Fluorine Content of Some Chinese Food Materials." *Proc. 3rd General Conference (Physiol. Section) Chinese Medical Association*, Canton, Nov. 1935, p. 20.

E. Reid :

"The Fluorine Content of Drinking Waters in Relation to the Occurrence of Mottled Enamel in China." *Proc. 3rd General Conference (Physiol. Section) Chinese Medical Association*, Canton, Nov. 1935, p. 20.

### STAFF CHANGES

As a Division we suffered a great loss in the death of Dr. Eric Reid on November 24, 1935. The Staff Committee recorded its high appreciation of his work. He was utterly dependable, he at all times showed a fine spirit of co-operation, and his scientific contribution to China, though short, had a quality about it of the highest

merit. The record of his good work appears in this and last years annual report, and his other studies in the field of nutrition will be completed and published shortly.

Dr. C. L. Yi after completing two years scholarship work, obtained a scholarship from the Peiping Union Medical College where he is completing his training in physiology. Under Dr. Tsai's able direction he made a good contribution to our work and gained an experience which should make him in due course a leader in this field.

As reported last year Dr. C. Pak was away on a Holt travelling fellowship in England where he participated in the work at the National Medical Research Institute upon the new international standard for insulin. Dr. Pak also spent some time at the laboratories of the Pharmaceutical Society studying the latest methods of Biological Standardization.

Miss Ruth Chester of Ginling College attended the Institute as a visiting worker for two months in the summer, co-operating with Mr. W. Y. Lee in his studies upon the metabolic changes of sprouting peas and beans.

#### SERVICES

The technicians' training class this year has been led by Mr. W. Y. Lee, who presented to the group a series of weekly lectures on industrial chemistry in the organic field as it applied to the needs of our workers.

The workshops have continued to render excellent service under Mr. G. Blow's direction, supplying all of our special needs and repairs in wood, metal and glass work. We are indebted to the other divisions for a great deal of histological material, photographic work, X-ray pictures and the use of the animal operating theatre.

## DIVISION OF PATHOLOGICAL SCIENCES

Dr. R. CECIL ROBERTSON

The main scientific sections of the Division of Pathological Sciences are as follows :

- (1) Bacteriology and Virus Diseases
- (2) Immunology and Serology
- (3) Tissue Pathology
- (4) Parasitology
- (5) Medical Entomology

During the year under review certain readjustments were made owing to staff changes and a certain expansion of activities took place chiefly in Field work in connection with Parasitological Research.

The charge of the Section of Immunology and Serology was assumed by Dr. H. Yu on Dr. Y. P. Li's departure in April.

Dr. H. Wei replaced Dr. H. Yu in Clinical Bacteriological work at that time.

Dr. F. F. Tang left in August on a year's study leave in Great Britain and was accepted as a visiting worker at the National Research Institute, Hampstead, where he has very successfully continued further researches into the study of filtrable viruses.

Dr. M. N. Andrews left on home leave in March. Mr. Harry Ling was appointed to a Scholarship in Parasitology for the duration of one year in April.

On July 1st, Dr. Kuang Wu joined the Divisional Staff as a Research Fellow in Helminthology.

Dr. K. C. Mak's Scholarship in Bacteriology terminated in March.

Mr. C. H. Yen, Research Assistant in Medical Entomology, left in August for further study in the University of Minnesota in the United States.

Owing to the above-mentioned staff changes a certain amount of reorganization of the general activities of the Division took place but continuity was maintained in the investigation of the main problems of research on hand.

The general policy of the Division has remained unaltered namely to direct attention as far as possible to the investigation of diseases or of the parasites which cause diseases in Shanghai and the neighbouring parts of China. Considerable assistance in the collection of material for research has been rendered to this Division by various Hospitals in the provinces of Chekiang and Kiangsu. In Shanghai co-operation with the Shanghai Municipal Council Health Department has proved of mutual benefit. Certain investigations in Parasitology and Medical Entomology of value to the Health Department have been conducted in the Institute laboratories. On the other hand the research investigations in the Institute have been facilitated through the ready co-operation of Dr. J. H. Jordan, Commissioner of Public Health and his staff in helping us to obtain material for research. We have similarly obtained many facilities from Dr. Li Ting-an, Commissioner of Public Health of the Municipality of Greater Shanghai and from Professor Daniel Lai of the Department of Public Health of the National Medical College in connection with Entomological Research at the various Rural Health Stations in the Shanghai area.

#### (1) BACTERIOLOGY AND VIRUS DISEASES

For the purposes of description the main lines of investigation conducted during 1935 are grouped under the names of the bacteria causing the diseases being investigated.

##### *Studies on Bacillus Typhosus Isolated in Shanghai*

Seventy-six strains of *B. typhosus* were isolated from typhoid fever cases in Shanghai, most of the patients being under treatment in the Lester Chinese Hospital.

These locally isolated strains of typhoid bacilli were subjected to special investigation with regard to their antigenic structure. The presence of Vi antigen was demonstrated. From the results of the various experiments conducted it was deduced that the Vi antigen factor was more closely related to the production of "a protective effect" in immune serum than to "virulence" of the organism.

An interesting case was noted in which blood culture yielded two different types of *B. typhosus*, a motile and a non-motile organism. Stool culture yielded only a non-motile bacillus.

In connection with some further work on the "O" resistant properties of virulent typhoid bacilli Dr. H. Yu reported that this



property could be altered by (a) Cultivation at low temperatures  
(b) Heating at 100°C for one hour.

One of the main research investigations undertaken in connection with Typhoid bacilli is reported under the Section of Immunology and Serology namely the production of a new curative Anti-typhoid Serum.

#### *Tuberculosis*

Dr. Y. P. Li concluded his studies on strains of tubercle bacilli isolated in Shanghai by presenting a demonstration on B. tuberculosis. A large selection of different types of media were shown including interesting examples of special means for differentiating the three main types of tubercle bacilli.

Dr. F. F. Tang carried out a series of studies on *Bacillus Calmette Guérin* (B.C.G.). A number of animals including one buffalo, a donkey, three goats, six monkeys, twelve rabbits and eight guinea-pigs were infected with B.C.G. It was found that the culture was innocuous for most of these animals with certain notable exceptions. Extensive typical tuberculous lesions were produced in three rabbits, five guinea-pigs and one goat. Immunity seems to be produced in monkeys following subcutaneous vaccination with B.C.G. but not after oral or conjunctival administration.

In summarizing the results of these experiments it is considered that B.C.G. is certainly not permanently avirulent and it would be highly inexpedient to advocate its use for human prophylaxis at the present juncture.

#### *Cholera*

The cholera work discussed in the previous report has been continued in the Cholera Research Laboratory of this Institute by Dr. Pollitzer, microbiologist of the National Quarantine Service. The systematic investigation of regularly collected water samples from the Whangpoo River and the major creeks as previously outlined was carried on. It was noted that during the winter of 1934-35 cholera-like vibrios were more plentiful in these waters than had been the case in the corresponding months of 1933-34 and some misgivings were felt that this higher incidence, showing that conditions were favourable for the development of vibrios, might forecast a reappearance of cholera in the following summer. These fears were, however, not realized, cholera remaining altogether absent. It is interesting to note that the number of cholera-like vibrios found in surface waters showed a considerable drop as compared with 1934 from June, 1935, onwards.

Some additional methods of investigation were applied to water vibrios namely sugar fermentation tests after the method of Kauffmann (Copenhagen). This test indicated that a large number of the water vibrios did not show the reactions of true cholera vibrios but is of limited value as other cholera-like vibrios may give identical fermentative reactions to the true pathogenic type.

In conjunction with the Council on Medical Research of the Chinese Medical Association arrangements were made for the examination in the Cholera Research Laboratory of this Institute of faecal specimens from suspected clinical cholera cases in out-stations. A reliable method for collecting and forwarding such specimens having previously been worked out, 124 outfits were sent to various hospitals situated outside Shanghai. Owing presumably to a scarcity of choleraic like diseases only 21 samples were received back. These proved entirely negative for true cholera but interesting cholera-like strains were isolated upon three occasions. Moreover the investigation confirmed the fact formerly established in this Institute by Drs. R. C. Robertson and H. Yu that *Bacillus Morgan* No. 1 plays in this part of the world a causative rôle in gastrointestinal infection of grown-up persons.

During the last few years cholera investigators all over the world have devoted much attention to the question as to whether the existing standard method of agglutination diagnosis could be improved upon. The use of "O" sera has been advocated in certain quarters as being more in keeping with the antigenic structure of virulent organisms.

The Shanghai Central Cholera Bureau in the spring of 1935 created a special Sub-Committee on Serology which was convened under the chairmanship of Dr. R. C. Robertson with Dr. Pollitzer as secretary; other representatives from the various local laboratories were co-opted. Drs. Tang and H. Yu of this Institute served on the committee. A comprehensive memorandum on this intricate problem was submitted to the Committee on Epidemiology. Two meetings were held in May, 1935, at which the subject was thoroughly discussed and a plan for joint investigations was decided upon. Owing to the absence of cholera throughout the summer no practical tests were possible but no doubt the material accumulated will form a reliable guide for further work.

Another much debated question, namely that of the best method as to how to control the dosage of anti-cholera vaccination, was studied by Dr. H. Yu of this Institute in collaboration with Dr. M. Y. Dzen, Director of the Greater Shanghai Public Health Laboratory.

It was established using guinea-pigs that if two immunizing doses were administered and separated by a seven day interval, the protection produced was greater even using weak concentrations than if a single massive dose was inoculated. Thus the concentration utilized in China viz. 2,000 millions per cc. is only adequate when the two inoculation dosage system is followed. Since under practical conditions the single dose system must most usually be adopted, it is recommended that the single dose for prophylactic inoculation be at least 4,000 million cholera vibrios per cc.

### *Bacterial Flagella*

A new and improved technique for the study of the flagellar filaments of motile bacteria was elaborated by Dr. H. Wei. A special culture medium was devised in which he incorporated gum acacia solutions of different concentrations. These solutions act as retarding agents to the motility of the organism being investigated. The flagella can then be readily studied under the dark-field microscope and as their movements are slowed down it is possible to record them by microphotography. Many excellent photographs of bacterial flagella were thus secured and a number of these were shown at the annual conference of the Chinese Society of Pathology and Microbiology held at Canton in November.

The mechanism of the movement of certain flagellated organisms was also studied using this new technique.

## VIRUS DISEASES

### *Cultivation of Filtrable Viruses in Chick Embryo*

The cultivation of filtrable viruses has been pursued with two main objectives (a) A study of the developmental phases of the virus (b) An increased knowledge of the biological properties of viruses.

The dermal strain of vaccinia virus which has been cultivated on the chorio-allantoic membrane in a series of seventeen cultural passages was found to have gradually changed in its virulence. The alteration of its character was evidenced by both the kind of lesions it produced on the chick membrane and the increased virulence in titration tests in rabbits. In the first generation the lesions appeared in the form of generalized papules, but in the succeeding passages they became a granulomatous growth and finally they appeared in the form of a number of big sized pustules. On stained smears, it was found that the inclusion bodies produced in the ectodermal

cells were massive and para-nuclearly situated and those found in the entodermal cells were small, scanty and perinuclearly located. The existence of the virus in forms of coccoids, diplococcoids, bacillary and chain forms has been noticed on both stained and fresh tissue preparations.

Serial passage of the virus of herpes in two newly isolated strains was effectively carried to the fifth generation but no further.

*Photodynamic action of ultra violet light and certain dyes in virus conditions*

With a view to investigating the possibility of the quartz lamp as a cauterizing agent in cases of rabid dog bites, certain experiments were undertaken. It was found that a short exposure to ultra-violet light had a lethal effect on the rabies virus; however it was considered that the directional effect of the quartz light in wounds and its lack of penetration would render its value doubtful. In practice pieces of clothing or other matter might be carried into wounds and these would shelter the virus from exposure to the lethal rays of light.

The photodynamic action of methylene blue was also studied. The general object was to find out if the presence of such a dye in the tissues both before and after the administration of rabies virus reinforced the efficacy of irradiation as a sterilizing agent. The animals were not protected from the action of the virus. Although the original experiment gave results which were not encouraging, it was found that virus inactivated by irradiation is immunizing when administered by the intracerebral route in rabbits, but not by subcutaneous injections. Work on this aspect of the investigation is being continued.

*Pleuro-pneumonia of Cattle*

Further studies on the causal agent of this disease were made along two main lines.

(1) *Developmental Phases*: Further pleomorphic forms of the organism representing some of the stages of development have been noticed in cultures, namely the amœboid and giant ring forms. The formation of microscopic colonies in broth cultures was observed for the first time. A successful staining of the organism in smears is a very difficult matter. It was found that although the structure of the organism is practically invisible or very indistinct in bright fields the same smear showed a remarkably clear outline of the organism under dark field illumination. For both practical and theoretical interests, continuous observations were kept on a newly

isolated strain to determine the length of time required to alter its mode of development to that of an old laboratory strain of the organism. In a series of seventy-two cultural passages covering a period of ten months, no noticeable change has been observed with regard to its mode of development.

(2) *Biological Properties*: The tissue changes in the chorio-allantoic membrane of chicks which were inoculated with the organism were investigated with special reference to the formation of inclusion bodies inside the various cellular elements. In relation to the cultivation of this organism in the chick membrane, a kind of protoplasmic structure closely resembling the organism of pleuropneumonia was found in the blood of the chick. We described these as "Pseudo-pleuropneumonia forms." The organism of Bovine pleuropneumonia was found to be resistant to ultraviolet ray irradiation and to the photodynamic action of methylene blue. Its activity in steers may be enhanced by the addition of the testicular extract of rats.

F. F. Tang, H. Wei, D. L. McWhirter and J. Edgar :

"An Investigation of the Causal Agent of Bovine Pleuropneumonia." *The Jour. of Path. & Bact.*, 1935, 40, pp. 391-406.

F. F. Tang and C. H. Chou :

"Studies on the Relation of Bacterium Granulosis to Trachoma." *Jour. of Infectious Diseases*, 1935, 56, pp. 264-272.

F. F. Tang, S. H. Liu and L. S. Kau :

"A Case of Glanders in Man." *Chinese M.J.*, 1935, 49, pp. 248-255.

H. Wei :

"A Study of Bacterial Flagella by Dark-field Illumination." *The Pathology & Microbiology Supp. of the Chinese M.J.*, 1936, 50, pp. 135-142.

K. C. Mak :

"A Comparison of Various Media for the Isolation of Gonococcus." *The Pathology & Microbiology Supp. of the Chinese M.J.*, 1936, 50, pp. 153-158.

F. F. Tang :

"Studies of B.C.G. Cultures." *The Pathology & Microbiology Supp. of Chinese M.J.*, 1936, 50, pp. 186-194.

M. Y. Dzen and H. Yu :

"The Optimum Dosage of Prophylactic Cholera Vaccine." *The Pathology & Microbiology Supp. of Chinese M.J.*, 1936, 50, pp. 198-201.

R. C. Robertson and H. Yu :

"Studies on Bacillus typhosus in Shanghai." *The Jour. Path. & Bact.*, 1936, 42, pp. 53-58.

F. F. Tang, H. Wei and J. Edgar :

"Further Investigations on the Causal Agent of Bovine Pleuro-pneumonia." *The Jour. Path. & Bact.*, 1936, 42, pp. 45-51.



## (2) IMMUNOLOGY AND SEROLOGY

Research in pure Serology has been chiefly carried on in regard to the serodiagnosis of typhoid fever and the preparation of a new anti-typhoid serum. This work has been undertaken by Dr. H. Yu.

We have examined blood specimens of 145 clinically diagnosed cases of typhoid fever in our laboratory and obtained 75 positive cultures of *B. typhosus*. Applying the modern method of Widal test to these 75 proven cases of typhoid fever, we got in 68 both "H" and "O" agglutination in sufficient titres to record them as positive. The remaining seven bacteriologically proven cases, when examined serologically, gave a positive "O" agglutination but no "H" agglutination. This is to say that Widal tests using "H" agglutination alone are only 90 per cent accurate; by adding "O" agglutination the accuracy of the test may be improved by approximately 10 per cent. Among the 70 cases clinically diagnosed as typhoid fever, where we were unable to isolate typhoid bacilli from either blood, urine or stools, 57 gave neither "H" nor "O" agglutination. The remaining 13 cases gave also no "O" agglutination whatsoever but proved positive as to "H" agglutination. It appears therefore that the standard Widal technique using "H" suspensions alone may lead to an erroneously positive diagnosis in nearly 20 per cent of cases. It is important that hospitals and diagnostic laboratories use the "O" antigen, especially in places where facilities for blood cultures are lacking.

Through the researches of Felix and his collaborators as well as our own work on *B. typhosus*, a new curative serum for typhoid fever was prepared based on the finding of a new "Vi" antigen in *B. typhosus*. Having the opportunity in 1934 and 1935 of examining a large number of Shanghai cultures of *B. typhosus* we selected virulent and "O" resistant strains for the immunization of horses. We have treated 24 cases of classical typhoid fever with the serum thus obtained with results which are sufficiently encouraging for further investigation as to the possibility of applying this serum widely in the treatment of typhoid fever in this country. We feel sure that any means of decreasing the mortality or of cutting short the tedious course of this disease which is so prevalent in China will be of inestimable value.

Other work in serology and immunology includes:—

(a) 500 precipitation tests on the blood preference of our local anopheles were performed. The matter is commented upon under Entomology.

Cross immunity tests in connection with Schistosomiasis, Fasciolopsis, Fasciola hepatica and Clonorchis have been commenced and further work is in hand.

In collaboration with the Research Council of the Chinese Medical Association, a Dick test survey was conducted by the Department of Preventive Medicine of the Institute and this laboratory has prepared Dick toxin sufficient to test ten thousand persons. The results are under analysis by the Department of Preventive Medicine and Medical Statistics.

The report on the serodiagnosis of syphilis by Wassermann and Kahn tests for the Lester Chinese Hospital etc., appears in the Appendix.

R. C. Robertson and H. Yu :

"The Value of "H" and "O" Agglutination in the Serological Diagnosis of Typhoid Fever." *Chinese M.J.*, 1935, 49, pp. 1117-1121.

H. Yu :

"The Serum Treatment of Typhoid Fever." *Chinese M.J.*, 1936, 50, pp. 159-164.

### (3) TISSUE PATHOLOGY

Dr. L. S. Kau who had previously held a Research Fellowship in Tissue Pathology was appointed Associate on the first of January, 1935.

The amount of section cutting and histological diagnosis performed in this section has increased to a very great extent. As commented upon in the previous report this Institute is regarded by a large number of hospitals throughout China as a diagnostic laboratory in difficult cases of tissue pathology, especially when malignant or neoplastic growths are suspected.

This phase of the activities of the Tissue Pathological Laboratory commenced in connection with this Institute's statistical survey of diseases in China. In order to obtain ready co-operation from hospitals in completing the record cards, offers were made of help in pathological diagnosis. Although the survey has been modified and is no longer handled in this Institute the continuance of the pathological services has been maintained.

The undermentioned hospitals outside of Shanghai have availed themselves of section cutting and histological diagnosis during 1935.

Amoy, Hope Hospital

Amoy, Quarantine Hospital

Changchow, Changchow General Hospital

Chinkiang, Goldsby King Memorial Hospital  
Chuanchow, Fukien, Chuanchow General Hospital  
Foochow, Fukien, Foochow Christian General Hospital  
Hangchow, C.M.S. Hospital  
Hankow, Lutheran Mission Hospital  
Hinghwa, Fukien, St. Luke's Hospital  
Huchow, Chekiang, Huchow General Hospital  
Ichang, Hupeh, Buchanan Memorial Hospital  
Kityang, Kwangtung, Bixby Memorial Hospital  
Kuling, Kuling Medical Mission  
Shaoshing, Christian Hospital  
Soochow, Soochow Hospital  
Swatow, E.P. Mission Hospital  
Taichow, Kiangsu, Sarah Walkup Hospital  
Tientsin, German-American Hospital  
Wusih, St. Andrew's Hospital  
Yunnanfu, Yunnan, American Presbyterian Hospital

A total of 1,965 tissue specimens were reported upon during the year, from these 2,428 paraffin blocks were prepared and 7,284 slides made.

Forty post mortem examinations were conducted; 24 at St. Luke's Hospital and 16 at the Lester Chinese Hospital.

With regard to research work in Tissue Pathology other than the large amount of work emanating from the above-mentioned section work, Dr. L. S. Kau has been interesting himself in the Pathology of Paragonimiasis. Owing to the lack of human material the observations have been made upon experimental animals such as white rats and cats brought from the endemic area at Shaoshing or infected artificially in the laboratory with cysts of *Paragonimus* obtained from the fresh water crab *Potamon denticulatus*.

A series of interesting findings were made with regard to certain cases of Splenomegaly from Foochow. The etiology of the disease had been obscure but certain sections from an autopsy of the liver in a fatal case revealed *Schistosoma japonicum* ova. Further biopsy specimens from the liver gave similar findings in subsequent cases. Schistosomiasis had not been suspected in the Foochow area. The cases in question had never been outside the district. We are contemplating confirming the existence of Schistosomiasis in that area by making a search for infected molluscs.

L. S. Kau and A. S. Wong :

"Adamantinoma of the Upper Jaw." *Chinese M.J.*, 1936, 50, pp. 37-39.

L. S. Kau and Kuang Wu :

"Preliminary Report on the Histopathology of Paragonimiasis of Cats in China." *Paritology & Microbiology Supp. of the Chinese M.J.*, 1936, 30, pp. 101-105.

#### (4) PARASITOLOGY

##### (a) *Protozoology* — *Malaria*

Our field research interests in malariology date back from the time when we made a survey of 200 cases of malaria at Hankow in connection with the work of the laboratory on the Hospital Ship. It was of interest that we then found the commonest variety of malarial parasite was *Plasmodium falciparum* (sub-tertian malaria). The next in order of frequency was *Plasmodium malariae* (quartan malaria). This parasite was not in evidence until November and showed an increase in relative incidence during December. The relative frequency of the three forms of malarial parasites in producing malaria in a rural and a city population has been intermittently studied since the "Flood" period by Dr. Andrews in Shanghai. During 1935 Mr. Harry Ling whilst holding a scholarship appointment has made a nine months continuous survey of malarial cases at Kiao-chiao. Blood films have been taken from clinic patients, school children, etc. Out of over 10,000 examinations over 1,000 positive malarial films have been obtained. In order to complete a twelve months series of observations this work is being continued by Dr. Andrews in collaboration with Dr. George Chu, Parasitologist to the National Medical College, Shanghai. The observations will be analysed and presented in a communication during 1936. It is hoped to correlate the situation with regard to the incidence of malarial parasites with the study of the mosquito problem which has been undertaken at Kiao-chiao at the same time by our Entomological Section.

##### (b) *Helminthology*

In July, 1935, Dr. K. Wu joined the Institute staff as a Research Fellow in Parasitology. We were thus enabled to extend our studies in Helminthology to include Paragonimiasis on which Dr. K. Wu had been working for a number of years. We also made a special feature of obtaining material connected with the life cycle of other helminths causing disease. Such work necessitated more observations with regard to "field" conditions. Ample material was obtained from areas near Shanghai particularly in Chekiang province. Undoubtedly many important observations as to the transmission

and host parasite relationship of helminths can only be adequately elucidated under natural conditions in the "field." We have attempted whilst undertaking such observations to collect material for further confirmatory investigation in the laboratories of this Institute. The lines of study undertaken comprise morphology, taxonomy, physiology, life history, pathology in mammalian hosts, immunology and distribution.

### *Schistosomiasis japonica*

During the last two years investigations have been directed along two main lines—

- (a) the immunological phenomena in man and animals infected with the disease
- (b) the bionomics of the intermediate host, the *Oncomelania* snails

(a) A preliminary report has been made on the use of cercarial antigen by Dr. Andrews. The general findings indicate that these antigens are specific for the disease. Work is in hand with regard to investigating the question of group reactions among other trematodes.

(b) With regard to the intermediate host we find breeding takes place between April and May. During 1935 we were able to describe and photograph the ova of the mollusc in developmental stages, also the larval snails.

An interesting possibility of destroying the fecundity of *Oncomelania* snails by means of single tailed cercariæ is being explored. These single tailed cercariæ are probably associated with the Amphistoma group of Helminths and the life cycle is completed in avian or mammalian hosts. Should research indicate any practical possibilities in this connection it might lead to a measure of biological control of the incidence of the *Oncomelania* snails. We are already fairly certain that *Schistosomiasis* destroys the reproductive power of the molluscs. It remains then to discover some helminths inoffensive to man which will likewise attack the mollusc.

### *Paragonimiasis*

Studies on this lung fluke are for the present confined to the elucidation of its life history, the structure of the various stages, the distribution of the disease and the histopathology in animals.

(1) The life cycle of this trematode begins with the ova hatching out miracidia which enter the first intermediate host, a snail, *Melania*



*libertina*. After metamorphosis in the snail cercariæ are formed which emerge and penetrate the second intermediate host, a crab, *Potamon denticulatus*. The metacercariæ are commonly found in the muscles of these crabs as well as in the liver and gills. The final host becomes infected by eating the raw or insufficiently cooked crabs or through partaking of drinking water in which the metacercariæ may occur. In the present investigation cats, wild cats, leopards and man have been found naturally infected and in dogs, cats and white rats experimental infections have been established.

(2) From morphological considerations this trematode resembles the one described in Japan, as shown by the length of the gut in the daughter redia generation.

(3) The disease is fairly extensive in this part of China; at least this is evidenced by a survey made in the rate of infection among the crabs in Chekiang province. Six new centers of infection have been found, namely, Fenghwa, Yuyao, Wuhing, Kienteh, Kaihwa and Kinhwa. Shaoshing and Chuchi are the only two districts which have so far been proven to have the human infection in Chekiang province.

(4) The histopathology of the infected lungs closely resembles certain forms of tuberculosis. This topic is commented upon under tissue pathology.

The entire investigation is still under way and will later include the clinical aspect of the disease in man.

### *Fasciolopsiasis*

The helminth causing this disease has been studied chiefly in the larval stages as it occurs under natural conditions in endemic centres. Infected red water calthrops carry the encysted metacercariæ. We have secured excellent photomicrographs of these. The infected calthrops have been fed to pigs and the disease reproduced. The disease takes about three months to develop when very numerous adult *Fasciolopsis buski* are found in the intestines. We have infected monkeys with fasciolopsiasis but have up till the present found dogs immune. *Echinochasmus* ova are found in dogs' excreta and may readily be mistaken for *Fasciolopsis* ova since the ova of both species are similar in general contour and size.

### *Phyllodistomum* sp. novum

In the course of examining shrimps collected from Huchow district for the possible presence of *Paragonimus* we have found at least three interesting species of trematodes. Later examination of

the shrimps bought from the market in Shanghai also reveals that they are infected with the same kind of flukes. The shrimps are of two species, *Palaeon asperlus* von Marten and *P. nipponensis* de Haan.

One species of trematode definitely belongs to the genus *Phyllodistomum* Braun represented by the immature and mature stages in the reproductive organs of the shrimps. It is the same fluke which was reported by Dr. Du from Chengtu, Szechuen. As compared with the existing 24 species we find that our species resembles *P. folium* (v. Olfers) but for certain morphological differences we consider that the present species is new to science. Dr. K. Wu is now making a detailed description of the species and is also contemplating working out its life history.

The other two species of trematodes are represented by the larval stages only encysting in the muscles of shrimps and they seem to be mature in the cat fish. The final status of these two flukes has not yet been determined.

### Field Activities

With a view to collecting material for research and studying the actual conditions in nature we have made a number of collecting trips. For schistosomiasis material, Kashing and Soochow are often visited, for paragonimiasis material, Shaoshing and Huchow and for fasciolopsiasis material, Shiaooshan district.

Whilst attending the third C.M.A. Conference held at Canton in November Dr. K. Wu made a small collection trip in the neighbourhood of Wuchow, Kwangsi, where the crabs and snails have been examined for parasites. Whilst at Canton the clonorchiasis problem was studied along general lines.

Dr. Robertson has made a study on the transmission of helminths by vegetables in this part of China and on the effect of the human digestive juices upon helminth ova which have been cooked for varying periods. The results of these studies have been reported.

R. C. Robertson :

"The Transmission in China of Helminths by Vegetables." *The Pathology & Microbiology Supp. of Chinese M.J.*, 1936, 50, pp. 418-422.

"The Breeding Conditions of *Oncomelania hupensis*." *Lingnan Science Journal*, 1936, 15, pp. 55-56.

K. Wu :

"Notes on Certain Larval Stages of the Lung Fluke *Paragonimus* in China." *Chinese M.J.*, 1935, 49, pp. 741-746.

"Distribution of Paragonimiasis in China, I. Chekiang Province." *The Pathology & Microbiology Supp. of Chinese M.J.*, 1936, 50, pp. 442-448.

M. N. Andrews :

"The Examination of Fæces for the Ova of *Schistosoma japonicum*." *Chinese M.J.*, 1935, 49, pp. 42-46.

M. N. Andrews :

"Complement Fixation Reaction in *Schistosoma japonicum* with Cercarial Antigen Prepared from *Oncomelania hupensis*." *Journal of Helminthology*, 1935, 13, pp. 25-40.

## (5) MEDICAL ENTOMOLOGY

### *Filarial Transmission*

Laboratory studies on filarial transmission were continued during the past year. Observations were made on the effects of winter conditions on the development of the filarial parasites in the mosquito host. It was found that the filarial larvæ were not able to undergo any development in *Culex pipiens* var. *pallens* during the cold season. Most of the microfilariae ingested by the mosquito were not able to penetrate through the stomach wall of their host. The few that succeed in doing so were soon chitinized. The matured filarial larvæ in mosquitoes which were infected during the latter part of the autumn were found not to be able to survive the winter in their hosts.

### *Zoophilism of Anopheles*

Further data were obtained concerning the zoophilism of *Anopheles* in this area. Observations were made on the maxillary index of the species in relation to its food preference.

Experimental studies were made on this phase of anopheline bionomics. The *Anopheles* were enclosed overnight in a room with different types of domestic animals, along with man, so as to test their blood preferences. The blood engorged by these mosquitoes were subjected to precipitin tests by Dr. Yu Ho in our Serological Laboratory to determine their origin. *Anopheles* obtained from a cattle shed were found to show little attraction to human blood.

### *Racial Differences of Anopheles*

Studies were undertaken in collaboration with Mr. F. E. Baisis, Medical Entomologist to the Philippine Bureau of Health, on the racial differences of *A. hyrcanus* var. *sinensis* in China and the Philippine Islands. This mosquito, our local carrier, is not a factor in the transmission of malaria in the Philippine Islands. This investigation was based on consistent differences in egg characters. The

specimens examined were found to consist of three varieties, namely, *A. hyrcanus* var. *sinensis* Wiedemann, *A. hyrcanus* var. *lesteri* Baisas and Hu, and *A. hyrcanus* var. *pseudosinensis* Baisas. The regional distribution of these varieties and their relation to malarial transmission are to be studied.

### *Studies on Flies*

A programme of studies on Shanghai flies commenced during the past year. Co-operation with the S.M.C. Public Health Department enabled us to have our fly traps distributed in different parts of the city by health inspectors. These were forwarded to our laboratory twice weekly for examination. We are making preliminary studies on the taxonomy and bionomics of these local species of flies; their relation to the transmission of gastro-intestinal diseases under local conditions will be investigated in due course.

S. M. K. Hu :

"The House-frequenting Behaviour of *Anopheles hyrcanus* var. *sinensis* Wiedemann in the Shanghai Area. I. Time of Entry." *Lingnan Science Journal*, 1935, 14, pp. 385-394.

C. H. Yen and T. L. Chang :

"The Periodicity of *Microfilaria malayi* Brug as Observed from a Case in the Lester Chinese Hospital, Shanghai." *Lingnan Science Journal*, 1935, 14, pp. 399-402.

H. C. Ma and T. L. Chang :

"Observations on the Maxillary Teeth of *Anopheles hyrcanus* var. *sinensis* Wiedemann in Shanghai Region." *Lingnan Science Journal*, 1935, 14, pp. 611-615.

S. M. K. Hu :

"Notes on the Relative Adult Density of *Anopheles hyrcanus* var. *sinensis* Wiedemann during 1933 with Reference to Malaria Incidence in Kaochiao, Shanghai Area." *Chinese M.J.*, 1935, 49, pp. 469-474.

S. M. K. Hu :

"Preliminary Observations on the Longevity of Infective Larvæ of *Wuchereria bancrofti* Cobbold in *Culex pipiens* var. *pallens* Coquillett." *Chinese M.J.*, 1935, 49, pp. 529-536.

C. Tomanoff and S. M. K. Hu :

"Sur le Comportement trophique d'*Anopheles hyrcanus* var. *sinensis* dans la Region de Shanghai." *Bulletin de la Societe de Pathologie Exotique*, 1935, 28, pp. 832-835.

R. C. Robertson, S. M. K. Hu and R. V. Dent :

"The Tiger Mosquito in Shanghai." *China Journal*, 1935, 23, pp. 299-306.

S. M. K. Hu :

"Studies on the Susceptibility of Shanghai Mosquitoes to Experimental Infection with *Wuchereria bancrofti* Cobbold.

I. *Aedes albopictus* Skuse.

Peking Nat. Hist. Bull., 1935, 9, pp. 249-254.

II. *Armigeres obturbans* Walker.

Peking Nat. Hist. Bull., 1935, 9, pp. 255-260.

III. *Culex tritaeniorhynchus* Giles.

Peking Nat. Hist. Bull., 1935, 10, pp. 39-43.

IV. *Aedes vexans* var. *nipponii* Theobald."

Peking Nat. Hist. Bull., 1935, 10, pp. 127-131.

### SCIENTIFIC PHOTOGRAPHY

The equipment of the Photographic Laboratory has been amplified during the year under review by the addition of illuminating devices for photomicrography. A Cine Kodak "special" was acquired. The apochromatic objectives in the microscopic equipment of the Division of Pathological Sciences have been placed at the disposal of the laboratory for use in high power photomicrographic work.

The output of this section has steadily increased in volume and the high technical quality of the work has been maintained. During the year a Cine film on the Transmission of *Filaria* was completed. This film was exhibited in this Institute and at Canton to the C.M.A. Conference.

Mr. R. V. Dent has made some interesting improvements in the technique of low power dark field photomicrography.

Besides offering an indispensable service to this and other Divisions of the Institute, the research side of scientific photography has received attention. The use of emulsions sensitive to different bands of the spectrum in recording skin colouration has been studied. Some observations as to the degree of penetration of infra red rays in dermatological conditions have been made.

The various Institute lecturers have been provided with lantern slide illustrations of their subject matter whenever required. The projection apparatus in the Lecture Hall has been adapted for more convenient projection of lantern slides.

R. V. Dent :

"Altering Contrasts by Varying Printing-Light Intensity." *The British Journal of Photography*, March 22, 1935.



R. V. Dent :

"Low Power Dark-Field Photography." *The British Journal of Photography*,  
August 16, 1935.

### *Technical Services*

The Media Rooms have produced approximately 555 litres of various types of media. A detailed list of these will be found in the Appendix.

### *Technicians in Training*

Requests from other Institutions for short courses of training for visiting technicians have been met when possible. Whilst our staff is chiefly engaged in Research work we have occasionally trained technicians who have already had some experience in laboratory technique. This is accomplished by placing such visiting technicians for a short period in each section.

Lecture courses in technology are given for the benefit of our own Institute technicians so that they may have a broader scope to their training and tend to prevent their work becoming over specialized in one section.

### *Journal Club*

The professional staff meet weekly in conference on a selected subject which is connected with some feature of the research work in hand. Current literature is read and the bearing of such on our own investigations is freely discussed. The immunity phenomena in parasitic diseases has formed an interesting topic to which contribution can be made by workers associated with problems in Serology, Pathology and Parasitology.

Occasional meetings with the staff of the Division of Physiological Sciences have proved stimulating since modern problems in Bacteriology and Immunology require ever increasing attention to be paid to underlying biochemical considerations. Similarly many biological reactions in the study of Bacteria have a close relationship to certain aspects of the chemistry of nutrition and the nutritional factors which may control the resistance to bacterial invasion of man and animals. The workers in this Division by such joint conferences and by the close interest displayed in the Institute lecture programme keep themselves informed of the progress being made in allied sciences.

*The Supply of Material for Teaching and Research to Universities and Other Institutions*

Requests for interesting specimens especially those relating to Parasitology have been very numerous during 1935.

This has been brought about by the work of this Institute becoming increasingly known abroad. We have also had visits from a number of distinguished scientists from Europe and America who naturally desire to illustrate the types of parasitic diseases etc., they have seen under investigation here with actual specimens.

A list of some of these contributions appears in the Appendix.

We have instituted a collecting system in connection with the Parasitological Laboratories where specimens are identified and stored in a special museum cabinet. New specimens are card indexed and similarly issues to other Institutions are registered.

We are unable to make this work which involves much time and labour a definite feature of our organization though we feel that by interchanges of teaching and research material, relationships with other Institutions abroad can be fostered and maintained. On this account we have attempted to meet most of the requests whenever possible and only stipulate that the receipt of such donations of specimens or illustrations be duly acknowledged as betwixt institutions. Further that when specimens or photographs are placed in a museum elsewhere that due acknowledgment of their origin should be indicated on the label.

## APPENDIX I

### GENERAL LIST OF PUBLICATIONS BY THE STAFF OF THE INSTITUTE (MENTIONED IN THIS REPORT)

- (1) M. N. Andrews :  
    "The Examination of Fæces for the Ova of *Schistosoma japonicum*." *Chinese M. J.*, 1935, 49, pp. 42-46.
- (2) M. N. Andrews :  
    "Complement Fixation Reaction in *Schistosoma japonicum* with Cercarial Antigen prepared from *Oncomelania hupensis*." *J. of Helminthology*, 1935, 13, pp. 25-40.
- (3) Y. F. Chi and B. E. Read :  
    "The Vitamin C content of Chinese Foods and Drugs." *Chinese J. of Physiology*, 1935, 9, pp. 47-62.
- (4) Y. F. Chi and Y. L. Tien :  
    "Researches on Pyrimidines. The Molecular Rearrangement of 2-ethylmercapto-5-ethyl-6-thiocyano-pyrimidine." *J. of American Chem. Soc.*, 1935, 57, pp. 215-217.
- (5) R. V. Dent :  
    "Altering Contrasts by Varying Printing-Light Intensity." *British J. of Photography*, March 22nd, 1935.
- (6) R. V. Dent :  
    "Low Power Dark-Field Photography." *British J. of Photography*, August 16th, 1935.
- (7) M. Y. Dzen and H. Yu :  
    "The Optimum Dosage of Prophylactic Cholera Vaccine." *The Pathology and Microbiology Supp. of Chinese M. J.*, 1936, 50, pp. 198-201.
- (8) H. S. Gear :  
    "Disease Incidence in China, an Analysis of Hospital Records for 1934." *Chinese M. J.* (in the press).
- (9) H. S. Gear :  
    "A Note on Malaria in China." *Chinese M. J.*, 1936, 50, pp. 131-136.
- (10) H. S. Gear, T. Y. Li, Y. B. Dju and J. Gear :  
    "Industrial Health in Shanghai, China. An Investigation of Printing Works." *Chinese Medical Association, Special Report Series*, No. 4, 1935.
- (11) J. Gray :  
    "The Effects of Obstruction of the Urinary Tract with Particular Relation to the Formation of Stones." *British J. of Surgery*, 1935, 23, pp. 451-457.

- (12) J. Gray :  
"The Effect of Experimental Interference with the Blood Supply of the Kidneys." *British J. of Surgery*, 1935, **23**, pp. 458-468.
- (13) J. Gray :  
"Suprapubic Drainage of the Bladder, its Indications and Contraindications." *Chinese M. J.*, 1935, **49**, pp. 537-541.
- (14) H. C. Hou :  
"Vitamin A in Nutrition in China." *Nutrition Notes*. May 1935.
- (15) H. C. Hou :  
"Vitamins B<sub>1</sub> and B<sub>2</sub> in Nutrition in China." *Nutrition Notes*. October 1935.
- (16) H. C. Hou :  
"Vitamin D in Nutrition in China." *Nutrition Notes*. June 1935.
- (17) H. C. Hou :  
"Some Differences in the Values obtained by the Chemical and Biological Assays of Vitamin C in Certain Foods." *Chinese J. of Physiology*, 1935, **9**, pp. 291-298, also *Proc. 8th Annual Meeting, Chinese Physiological Soc.*, Peiping, 1935, pp. 16-17.
- (18) H. C. Hou :  
"Further Studies on the Chemical and Biological Assays of Vitamin C." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association*, Canton, November 1935, p. 9.
- (19) H. C. Hou :  
"A Comparative Study of the Vitamin C content of Several Varieties of Chinese Oranges." *Chinese J. of Physiology*, 1935, **9**, pp. 223-244.
- (20) H. C. Hou :  
"The Variations of Vitamin C content in Certain Fruits and Vegetables." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association*, November 1935, p. 8.
- (21) H. C. Hou :  
"The Vitamin C Content of Two Varieties of Chinese Amaranth, Hsien Ts'ai." *Chinese J. of Physiology*, 1935, **9**, pp. 253-260.
- (22) H. C. Hou :  
"Comparison of Oral and Subcutaneous Administration of Protective Doses of Ascorbic Acid (Vitamin C)." *Proc. Soc. Exper. Biology and Medicine*, 1935, **32**, pp. 1391-1392, also *Proc. 8th Annual Meeting Chinese Physiological Society*, Peiping, 1935, pp. 14-15.
- (23) H. C. Hou :  
"The Relation Between the Antiscorbutic Activity and the Mode of Administration of Ascorbic Acid." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association*, Canton, 1935, p. 8.
- (24) H. C. Hou :  
"The Ascorbic Acid Content of Certain Organs of Chicks Raised on Vitamin C Deficient Ration." *Science*, 1935, **82**, p. 423.

- (25) H. C. Hou :  
"A Modification of Sherman and Smith's Vitamin A Deficient Ration for Rats." *Chinese J. of Physiology*, 1935, 9, pp. 197-206.
- (26) H. C. Hou :  
"Studies on the Interrelationship of Vitamins and other Dietary Constituents. I. Vitamins A and D and other Dietary Constituents in Relation to the Formation of Urinary Calculi." *Chinese J. of Physiology*, 1935, 9, pp. 299-306, also *Proc. 8th Annual Meeting, Chinese Physiological Society*, Peiping, 1935, pp. 15-16.
- (27) H. C. Hou :  
"The Effect of Varying the Quantities of Vitamin A and D and other Dietary Constituents on the Albino Rat." *Summary of Communications, the 15th International Physiological Congress*, Leningrad, Moscow, Aug. 1935, pp. 161-162.
- (28) S. M. K. Hu :  
"The House-frequenting Behaviour of *Anopheles hyrcanus* var. *sinensis* Wiedemann in the Shanghai Area. I. Time of Entry." *Lingnau Science J.*, 1935, 14, pp. 385-394.
- (29) S. M. K. Hu :  
"Notes on the Relative Adult Density of *Anopheles hyrcanus* var. *sinensis* Wiedemann during 1933 with reference to Malaria Incidence in Kaochiao, Shanghai Area." *Chinese M. J.*, 1935, 49, pp. 469-474.
- (30) S. M. K. Hu :  
"Preliminary Observations on the Longevity of Infective Larvæ of *Wuchereria bancrofti* Cobbold in *Culex pipiens* var. *pallens* Coquillett." *Chinese M. J.*, 1935, 49, pp. 529-536.
- (31) S. M. K. Hu :  
"Studies on the Susceptibility of Shanghai Mosquitoes to Experimental Infection with *Wuchereria bancrofti* Cobbold.  
I. *Aedes albopictus* Skuse.  
Peking Nat. Hist. Bull., 1935, 9, pp. 249-254.  
II. *Armigeres obturbans* Walker.  
Peking Nat. Hist. Bull., 1935, 9, pp. 255-260.  
III. *Culex tritaeniorhynchus* Giles.  
Peking Nat. Hist. Bull., 1935, 10, pp. 39-43.  
IV. *Aedes vexans* var. *nipponii* Theobald."  
Peking Nat. Hist. Bull., 1935, 10, pp. 127-131.
- (32) L. S. Kau and A. S. Wong :  
"Adamantinoma of the Upper Jaw." *Chinese M. J.*, 1936, 50, pp. 37-39.
- (33) L. S. Kau and Kuang Wu :  
"Preliminary Report on the Histopathology of Paragonimiasis of Cats in China" *Pathology & Microbiology Supp. of the Chinese M. J.*, 1936, 50, pp. 101-105.



- (34) W. Y. Lee :  
    "Dietary Surveys in Shanghai." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association*, Canton, November 1935, p. 11.
- (35) H. C. Ma and T. L. Chang :  
    "Observations on the Maxillary Teeth of *Anopheles hyrcanus* var. *sinensis* Wiedemann in the Shanghai Region." *Lingnan Science J.*, 1935, **14**, pp. 611-615.
- (36) K. C. Mak :  
    "A Comparison of Various Media for the Isolation of Gonococcus." *The Pathology and Microbiology Supp. of the Chinese M. J.*, 1936, **50**, pp. 153-158.
- (37) P. G. Mar and B. E. Read :  
    "Chemical Examination of Chinese Remedies for Night-blindness." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association*, Canton, November 1935, p. 13.
- (38) J. L. Maxwell :  
    "The Treatment of Leprosy from a Public Health Point of View." *Chinese M. J.*, 1935, **49**, pp. 313-324.
- (39) J. L. Maxwell :  
    "Leptosaria and Organized Leprosy Clinics." *Chinese M. J.*, 1935, **49**, pp. 957-962.
- (40) T. G. Ni :  
    "The Composition and action upon calcium metabolism of Ah-chiao (donkey-skin glue) and commercial gelatin." *Chinese J. of Physiology*, 1935, **9**, pp. 329-338.
- (41) T. G. Ni :  
    "Note on the Hematopoietic Action of Ah-chiao (donkey-skin glue)." *Chinese J. of Physiology*, 1935, **9**, pp. 383-394, also *Proc. 8th Annual Meeting Chinese Physiological Society*, Peiping, 1935, p. 27.
- (42) T. G. Ni :  
    "The Creatine and Creatinine Excretion and the Creatine Content of Muscle in Nutritional Muscular Dystrophy." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association*, Canton, 1935, p. 14.
- (43) T. G. Ni :  
    "The Effect of Donkey-skin Glue upon Nutritional Progressive Muscular Dystrophy." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association*, Canton, 1935, p. 15.
- (44) C. Pak and B. E. Read :  
    "The Action of Ephedrine Quaternary Helide Compounds." *Chinese J. of Physiology*, 1935, **9**, pp. 1-16.
- (45) C. Pak and B. E. Read :  
    "The Anthelmintic Properties of Propyl Guaiacol." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association*, Canton, November 1935, p. 15.

- (46) B. S. Platt :  
    "An Approach to the Problems of Infant and Child Nutrition in China." *Chinese M. J.*, 1936, 50, pp. 410-424.
- (47) B. S. Platt and G. D. Lu :  
    "Intermediate Carbohydrate Metabolism in Vitamin B<sub>1</sub> Deficiency in Man." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association, Canton, November 1935*, p. 16.
- (48) B. S. Platt and E. F. Yang :  
    "The Supply and Excretion of Vitamin C in Man." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association, Canton, November 1935*, p. 18.
- (49) B. E. Read :  
    "Some Properties of Ephedrine Alkaloid." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association, Canton, November 1935*, p. 19.
- (50) E. Reid :  
    "The Nutritive Properties of Soybean-egg Powder, a Substitute for Cow's Milk in Infant Dietary." *Chinese J. of Physiology*, 1935, 9, pp. 27-42.
- (51) E. Reid :  
    "The Calcium, Phosphorus, and Nitrogen Retention of Rats on Soybean-egg Powder and Whole Milk Powder Diets." *Chinese J. of Physiology*, 1935, 9, pp. 307-314, also *Proc. 8th Annual Meeting Chinese Physiological Society, Peiping, 1935*, p. 28.
- (52) E. Reid :  
    "The Fluorine Content of Some Chinese Food Materials." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association, Canton, November 1935*, p. 20.
- (53) E. Reid :  
    "The Fluorine Content of Drinking Waters in Relation to the Occurrence of Mottled Enamel in China." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association, Canton, November 1935*, p. 20.
- (54) R. C. Robertson :  
    "The Transmission in China of Helminths by Vegetables." *Pathology & Microbiology Supp. of the Chinese M. J.*, 1936, 50, pp. 418-422.
- (55) R. C. Robertson :  
    "The Breeding Conditions of *Oncomelania hupensis*." *Lingnan Science J.*, January 1936, 15, pp. 55-56.
- (56) R. C. Robertson, S. M. K. Hu and R. V. Dent :  
    "The Tiger Mosquito in Shanghai." *China J.*, 1935, 23, pp. 299-306.
- (57) R. C. Robertson and H. Yu :  
    "Studies on *Bacillus typhosus* in Shanghai." *J. of Pathol. and Bact.*, 1936, 42, pp. 53-58.
- (58) R. C. Robertson and H. Yu :  
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"Studies of B. C. G. Cultures." *The Pathology and Microbiology Supp. of the Chinese M. J.*, 1936, 50, pp. 186-194.
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- (63) F. F. Tang, H. Wei and J. Edgar :  
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- (64) F. F. Tang, H. Wei, D. L. McWhirter and J. Edgar :  
"An Investigation of the Causal Agent of Bovine Pleuro-pneumonia." *J. of Patbol. and Bact.*, 1935, 40, pp. 391-406.
- (65) C. Toumanoff and S. M. K. Hu :  
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- (66) C. Tsai :  
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- (67) C. Tsai :  
"Constancy of Internal Environment in the Human Body" (in Chinese). *Science*, 1935, 19, pp. 227-237.
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"Sugar Out-put and Intake of the Liver in the Normal Intact Cat." *Proc. 8th Annual Meeting Chinese Physiological Society*, Peiping, 1935, p. 32.
- (69) H. Wei :  
"A Study of Bacterial Flagella by Dark-Field Illumination." *The Pathology and Microbiology Supp. of the Chinese M. J.*, 1936, 50, pp. 135-142.
- (70) K. Wu :  
"Notes on Certain Larval Stages of the Lung Fluke *Paragonimus* in China." *Chinese M. J.*, 1935, 49, pp. 741-746.
- (71) K. Wu :  
"Distribution of Paragonimiasis in China. I. Chekiang Province." *Pathology & Microbiology Supp. of the Chinese M. J.*, 1936, 50, pp. 442-448.

- (72) E. F. Yang, G. D. Lu and B. S. Platt :  
"Studies on Rice. (1) Introductory." *Proc. 3rd General Conference (Physiol. Section), Chinese Medical Association*, Canton, November 1935, p. 26.
- (73) C. L. Yi and B. E. Read :  
"The Antipyretic Action of a New Antipyrine Derivative." *Chinese J. of Physiology*, 1936, 10, pp. 297-302.
- (74) C. H. Yen and T. L. Chang :  
"The Periodicity of *Microfilaria malayi* Brug as Observed from a Case in the Lester Chinese Hospital, Shanghai." *Lingnan Science J.* 1935, 14, pp. 399-402.
- (75) H. Yu :  
"The Serum Treatment of Typhoid Fever." *Chinese M. J.*, 1936, 50, pp. 159-164.

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## APPENDIX II

### LECTURE PROGRAMME 1935-36

- Dr. J. H. Jordan :  
"Some Aspects of Public Health Work in Shanghai."
- Dr. J. Gray :  
"The Nerve Supply of the Urinary Tract."
- Dr. H. C. Hou :  
"Vitamin C and its Relationship to Disease."
- Dr. C. E. Lim :  
"International Standardization of Biological Products."
- Dr. J. P. Maxwell :  
"One Hundred Years of Modern Medicine in China."
- Dr. P. Mar :  
"New Sources of Vitamin A and their Uses."
- Dr. S. M. K. Hu :  
"Some Aspects of Mosquito Transmission of Filariasis."
- Dr. T. F. Huang :  
"Medical and Health Problems on a Chinese Railway."
- Dr. H. Yu :  
"Serological Studies on B. Typhosus."
- Dr. H. G. Thompson :  
"The Function of the Cæcum and Vermiform Appendix and Its Relation to Appendicitis."
- Drs. B. S. Platt, E. F. Yang and S. Y. Gin :  
"Infant Nutrition and Its Problems in China."

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- Drs. Wu Kuang and L. S. Kau :  
    "Paragonimus in China and Histopathology of Paragonimus."  
Dr. J. L. Maxwell :  
    "The Distribution and Types of Leprosy in China."  
Dr. R. Pollitzer :  
    "Antigenic Structure of V. Cholerae."  
Mr. W. Y. Lee :  
    "Shanghai Factory Diets."  
Dr. Wei Hsi :  
    "The Cultivation of Filtrable Viruses."  
Mr. E. A. G. Shrimpton :  
    "Genetic Principles in Human Welfare."  
Dr. B. S. Platt :  
    "Natural and Anomalous Colorations of the Skin."  
Drs. T. G. Ni and B. E. Read :  
    "Man's Protein Requirement and the Physiological Values in Chinese Gelatin."  
Dr. R. C. Robertson :  
    "The Organization of Field Medical Research in China."  
Mr. R. V. Dent :  
    "Photography in Medical Research."  
Dr. H. P. Chu :  
    "Chemotherapy of Kala Azar."  
Dr. C. Tsai :  
    "The Conduction of Nerve Impulses."  
Dr. Li Ting-An :  
    "Seasonal Variations in Birth Weights."  
Dr. H. G. Earle :  
    "The Racial Factor in Basal Metabolism."

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APPENDIX III

LIBRARY

*Additions to the Library 1935*

BOOKS

By purchase ... ..	185 Vols.
By exchange or donation from the publishing institutions ...	25 "
By private donation ... ..	18 "



# Henry Lester Institute of Medical Research

## PERIODICALS

By purchase ... ..	233	Vols.
By exchange or donation from the publishing institutions ...	13	"
By private donation ... ..	9	"

## REPORTS

By purchase ... ..	45	Copies
By exchange or donation from the publishing institutions ...	53	"
By private donation ... ..	11	"

## LIBRARY STOCK

Books ... ..	1,353	Vols.
Journals (bound) ... ..	2,266	"
*Miscellaneous ... ..	509	Copies

\* Including annual reports, special reports, pamphlets, selected papers, proceedings, monographs, etc.

## BOOKS AND JOURNALS ISSUED TO READERS

	<i>Books</i>	<i>Journals</i>	<i>Total</i>
1934 ... ..	1,480	994	2,474
1935 ... ..	1,812	1,261	3,073

## NUMBER OF PERSONS USING THE LIBRARY

	1933	1934	1935
January ... ..	161	203	400
February ... ..	192	325	313
March ... ..	237	268	294
April ... ..	250	359	251
May ... ..	270	331	268
June ... ..	205	302	265
July ... ..	210	294	234
August ... ..	240	201	227
September ... ..	270	457	248
October ... ..	372	429	302
November ... ..	395	447	285
December ... ..	410	491	290
Total ... ..	3,212	4,107	3,578

Henry Lester Institute of Medical Research

INTER-LIBRARY LOANS

A

<i>Name of Institutions</i>	<i>Borrowed</i>	<i>Lent</i>
Aurora University ... ..	1	
Chinese Medical Association ... ..	5	
National Medical College of Shanghai ... ..	57	56
National Research Institute of Chemistry ... ..	44	3
National Research Institute of Physics ... ..	4	
Peiping Union Medical College ... ..	4	
Royal Asiatic Society Library ... ..	1	
St. John's University Medical College ... ..	7	
St. Luke's Hospital Library ... ..	12	
Shanghai Science Institute ... ..	14	
Shanghai Science Society ... ..	2	
S.M.C. Public Health Department ... ..	21	5
Tung Chi University Medical College ... ..	1	
Total ...	173	64

INTER-LIBRARY LOANS

B

		<i>Books</i>	<i>Journals</i>	<i>Total</i>
1934	Borrowed		45	45
	Lent	1	46	47
1935	Borrowed	17	156	173
	Lent	6	58	64

# APPENDIX IV

## DIVISIONAL CO-OPERATION AND SERVICES

The function of the Directorate is to control services which are required by all Divisions, but each Division, having regard to its special facilities, also controls services for the benefit of other Divisions.

*The Division of Clinical Research and Experimental Surgery* through its control of beds within the Lester Hospital renders a service to the whole Institute, by supplying the other Divisions with material not only for examination but also for investigation. In its Department of Experimental Surgery, at the Institute, a suite of rooms is provided for the conduct of experimental work on animals under hospital conditions. In addition, the Division has an X-Ray plant installed both at the Hospital and at the Institute and so provides services in Radiology.

*The Division of Physiological Sciences* maintains laboratory workshops in the basement where apparatus can be repaired and new apparatus made for special purposes; while the Head of the Division by his general supervision of the Animal House renders a service, through the Directorate, to all Divisions.

*The Division of Pathological Sciences* provides services in clinical bacteriology, serology, parasitology, tissue pathology, and the preparation of media for bacteriological work. The Division also maintains a standard collection of stock cultures.

*The Photographic Laboratory*, with a full-time Associate in Scientific Photography, is proving a fundamental asset to the research work in all Divisions. It is equipped for cinematographic pictures of living organisms, photomicrography clinical and other photography, both in colour and monochrome.

*The Department of Medical Statistics*, in addition to epidemiological researches already in hand, is organized to assist other Divisions in the statistical presentation of their data and to apply statistical methods to the elucidation of particular research problems.

WARD ADMISSIONS.—Patients admitted to the Clinical Unit in the Lester Chinese Hospital, Fifth Floor, between January 1st and December 31st, 1935 :

Medical	...	...	...	139
Surgical	...	...	...	227
				<hr/>
Total	...	...	...	366

MEDICAL CASES included :

### (1) Nutritional

Beri-beri	...	...	...	...	67
Hypovitaminosis...	...	...	...	...	3
Nutritional Oedema	...	...	...	...	1
Pellagra	...	...	...	...	2
Feeding Cases	...	...	...	...	10
Wet Nurses	...	...	...	...	14

## Henry Lester Institute of Medical Research

### (2) Parasitic and Infections

Relapsing Fever	...	...	...	...	2
Tuberculosis	...	...	...	...	4
Typhoid Fever	...	...	...	...	6
Syphilis	...	...	...	...	2
(3) Diseases of the Nervous System	...	...	...	...	5
(4) Diseases of the Heart and Circulatory System	...	...	...	...	4
(5) Diseases of the Respiratory System	...	...	...	...	6
(6) Various	...	...	...	...	13

139

### SURGICAL CASES included :

	Cases	Operations
(1) Congenital	2	1
(2) Traumatic	18	14
(3) Inflammatory		
Bones and Joints, T.B.	4	1
Bones and Joints, Acute	4	3
Alimentary System	76	64
Urinary System, Chronic infection	18	5
Urinary System, Acute infection	49	40
Lymphatic System	9	8
Vascular System	3	0
Nervous System	4	0
Various	10	10
(4) New Growths and Cysts	30	28

227

174

DIAGNOSTIC THEATRE.—The Diagnostic Theatre in the Research Department has been used for the following purposes :

Cystoscopies	...	...	...	...	80
Urethroscopies	...	...	...	...	21
Sigmoidoscopies	...	...	...	...	4
Other major investigations	...	...	...	...	27

132

X-RAY.—The new X-Ray apparatus has been installed at the Institute under the care of Miss O. Barton and is producing satisfactory work. The X-Ray apparatus at the Hospital under the charge of Mr. O. G. R. Beynon, the Radiographer, has been reconditioned and is continuing to give good results both in Institute and Hospital cases.

OPERATION THEATRE.—The operation theatre in the Experimental Surgical Department at the Institute has been well used during the year 1935. The total number of operations amounted to 520, all of which were done under general anaesthesia.

THE SURGICAL DEPARTMENT LABORATORY.—In the Surgical laboratory a total of 2,040 Paraffin blocks were cut for microscopic examination of which 167 were as a service to the Hospital. In addition 112 smear and teased preparations were examined, 22 Frozen sections, 77 analyses of Urinary Stones, and 283 Blood counts were reported upon.

MEDICAL DEPARTMENT LABORATORIES.—In addition to the special research work of this department a service of reports of routine examinations is supplied to the Surgical research department and to the Lester Chinese Hospital. The figures are given below :—

LIST OF NUMBERS OF DIFFERENT ROUTINE SPECIMENS EXAMINED BY THE  
MEDICAL DEPARTMENT FROM JANUARY TO DECEMBER 1935

<i>Type of Examination</i>	<i>Number for Med. Dept.</i>	<i>Number for Surg. Dept.</i>	<i>Number for Hospital</i>	<i>Total</i>
Blood for Cytological Examination	451	337	20	808
Blood for Chemical Examination	301	25	55	381
Urine for Cytological Examination	334	528	1	863
Urine for Chemical Examination	136	2	1	
Cerebro-spinal fluid for Chemical and Cytological Exam.	212	13	66	291
Gastric juice for Fractional analysis	23	33		56
Smears for Parasitological and Bacteriological Examination	30	31		61
Sputum, Stool, Pus, Swab, and Vomitus for Examination	144	63		207
Blood for Serological Examination	1		6	7
Scraping for Fungus Examination	83			83
Hydrocele Fluid for Examination		1		1
Total	1,715	1,033	149	2,758



**MATERIA MEDICA.**—A number of botanical specimens have been sent in for identification, and report upon their medicinal uses. A bad case of Gelsemium poisoning of three patients required analysis of the raw material and stomach contents, and a study of the toxic effects by physiological tests; Dr. Pak made a complete and satisfactory report upon this, which is being published in the "National Medical Journal of China." As reported in previous years we have had numerous enquiries from various parts of the world concerning Chinese foods and drugs, which have needed in many cases extensive bibliographic research.

**CHEMICAL ROOMS.**—Specimens of water for fluorine analysis were dealt with by Dr. E. Reid. 477 litres of distilled water, 195 litres of absolute alcohol and 27 litres of chloroform were distilled for Division I. By special request we undertook about 200 special analyses for outside organizations.

**PHYSIOLOGICAL WORKSHOPS.**—The Workshops were busy throughout the year, and a total of 238 orders were completed: 45 being for Division I, 155 for Division II, and 38 for Division III. Of this total, 100 orders were for new apparatus, the remainder being for alterations and repairs to existing apparatus. Among the new apparatus was a freezing microtome, which was designed and built by the workshops. Apart from a few small drills, there were no breakages during the year. The workshop equipment is in first class condition.

#### CLINICAL BACTERIOLOGICAL LABORATORY

Services for the Lester Chinese Hospital (General Wards). Clinical Bacteriological Examinations:

<i>Blood:</i>	<i>B. typhosus</i> ... ..	25	
	<i>B. paratyphosus A</i> ... ..	2	
	Hemolytic streptococcus ... ..	1	
	Miscellaneous findings ... ..	79	Total — 107
<i>Urine:</i>	<i>B. typhosus</i> ... ..	10	
	<i>Streptococcus hemolyticus</i> ... ..	5	
	<i>Streptococcus viridans</i> ... ..	14	
	Miscellaneous findings ... ..	223	Total — 252
<i>Stool:</i>	<i>B. dysenteriae Shiga</i> ... ..	3	
	<i>B. dysenteriae Flexner</i> ... ..	22	
	<i>B. dysenteriae Schmitz</i> ... ..	3	
	<i>B. Morgan No. 1</i> ... ..	21	
	<i>B. typhosus</i> ... ..	20	
	Miscellaneous findings ... ..	133	Total — 202
<i>Throat Swab:</i>	<i>Streptococcus hemolyticus</i> ... ..	15	
	<i>Streptococcus viridans</i> ... ..	7	
	Miscellaneous findings ... ..	2	Total — 24
<i>Pus:</i>	<i>T. B. (g.p. positive-8; culture positive=4)...</i>	12	
	<i>B. typhosus</i> ... ..	1	
	Miscellaneous findings ... ..	60	Total — 73
<i>Sputum:</i>	Miscellaneous findings ... ..	9	Total — 9
<i>Fluids from Synovial Cavities:</i>			
	<i>T. B.</i> ... ..	1	
	Miscellaneous findings ... ..	58	Total — 59

*Cerebro-spinal Fluid :*

H. influenza	...	...	...	...	2	
T. B. (g.p. inoculation +)	...	...	...	...	1	
Streptococcus...	...	...	...	...	5	
Miscellaneous...	...	...	...	...	43	Total — 51
Miscellaneous specimens examined	...	...	...	...	101	Total — 101
Grand Total	...	...	...	...		887

<i>Auto-vaccine :</i>	Streptococcus...	...	...	...	20 cc	
	Staphylococcus	...	...	...	120 cc	
					140 cc	

SERVICES FOR THE CLINICAL UNIT

Bacteriological Examinations :

<i>Blood :</i>	B. typhosus ... ..	5	
	B. enteritidis ... ..	2	
	Pneumococcus ... ..	1	
	Streptococcus... ..	1	
	Miscellaneous findings ... ..	24	Total — 33
<i>Urine :</i>	Streptococcus hemolyticus ... ..	2	
	Streptococcus viridans ... ..	27	
	T. B. (g.p. inoculation) ... ..	1	
	Miscellaneous findings ... ..	370	Total — 400
<i>Stool :</i>	B. dysenteriae Shiga ... ..	1	
	B. dysenteriae Flexner ... ..	4	
	B. morgan No. 1 ... ..	9	
	B. enteritidis ... ..	2	
	B. typhosus ... ..	1	
	B. paratyphosus B ... ..	1	
	Miscellaneous findings ... ..	63	Total — 81
<i>Pus :</i>	Pyogenic organisms ... ..	15	
	T. B. (g.p. inoculation) ... ..	1	
	Miscellaneous findings ... ..	25	Total — 41
<i>Throat Swabs :</i>	Streptococcus hemolyticus ... ..	45	
	Streptococcus viridans ... ..	15	
	Miscellaneous findings ... ..	2	Total — 62
<i>Cerebro-spinal Fluid :</i>			
	Pneumococcus ... ..	1	
	T. B. (g.p. inoculation) ... ..	1	
	Miscellaneous findings ... ..	16	Total — 18
<i>Fluid from Synovial Cavities :</i>			
	Miscellaneous findings ... ..	7	Total — 7
<i>Miscellaneous Specimens Examined</i> ... ..		84	Total — 84
Grand Total ... ..			726
<i>Autogenous vaccines :</i> Streptococcus vaccine ... ..		40 cc	

SEROLOGICAL LABORATORY

	Positive	Negative	Anticomplementary	Doubtful	Total
Wassermann Test					
L.C.H.	1,615	2,071	61	92	3,839
Clinical Unit	81	244	4	25	354
Kahn Test					
L.C.H.	1,709	2,049		81	3,839
Clinical Unit	96	237		21	354
Widal Test					
L.C.H.	118	126			244
Clinical Unit	12	13			25
Weil-Felix					
L.C.H.	1	4			5
Clinical Unit	0	1			1
Fairley Test					
L.C.H.	6*	1			7
Clinical Unit	0	0			0
Total specimens examined for Lester Chinese Hospital					7,934

Total specimens examined for Clinical Unit 734

\* 4 with positive Wassermann Test

PARASITOLOGICAL LABORATORY :

Services for the Lester Chinese Hospital

165 examinations were made on specimens from 141 cases. All of these except one were faecal examinations. Faecal specimens were usually sent to us from the Hospital when a special examination for Schistosome ova was required, for the identification of worms after treatment, or in cases of suspected amœbic dysentery. The following are the chief findings in the specimens examined.

Entamœba histolytica	...	...	...	...	3 cases
Entamœba coli cysts	...	...	...	...	16 "
Endolimax nana cysts	...	...	...	...	15 "
Iodine cysts	...	...	...	...	1 case
Giardia cysts and free forms	...	...	...	...	9 cases
Trichomonas	...	...	...	...	5 "
Ascaris ova	...	...	...	...	43 "
Trichuris ova	...	...	...	...	62 "
Hookworm ova	...	...	...	...	45 "

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Schistosome ova	...	...	...	...	...	14 cases
Clonorchis sinensis ova	...	...	...	...	...	6 "
Fasciolopsis buski ova	...	...	...	...	...	3 "
Tænia ova	...	...	...	...	...	3 "
Blastocysts	...	...	...	...	...	41 "
Charcot Leyden crystals	...	...	...	...	...	7 "
Ascaris worms...	...	...	...	...	...	10 "
Ancylostoma duodenale worms	...	...	...	...	...	8 "
Necator americanus worms	...	...	...	...	...	6 "
Oxyuris worms	...	...	...	...	...	3 "

### TISSUE PATHOLOGY LABORATORY :

This laboratory received 1,779 biopsy specimens for examination from the following local sources and other Divisions of the Lester Institute :

Division of Physiological Sciences	...	...	...	...	...	408
Parasitological Laboratory	...	...	...	...	...	34
Bacteriological Laboratory	...	...	...	...	...	141
Clinical Bacteriological Laboratory	...	...	...	...	...	69
Serological Laboratory	...	...	...	...	...	15
Tissue Pathology Laboratory	...	...	...	...	...	258
Clinical Unit, Lester Institute	...	...	...	...	...	13
Lester Chinese Hospital	...	...	...	...	...	407
St. Luke's Hospital	...	...	...	...	...	342
St. Elizabeth's Hospital	...	...	...	...	...	33
Bethel Hospital	...	...	...	...	...	12
Keylock and Pratt	...	...	...	...	...	12
Shanghai Public Hospital	...	...	...	...	...	5
International Institute Hospital for Women	...	...	...	...	...	1
Chiao-Tung University (Prof. Barker)	...	...	...	...	...	6
Other sources	...	...	...	...	...	23

The following autopsies were performed :

Lester Chinese Hospital	...	...	...	...	10 cases
Clinical Unit	...	...	...	...	6 "
Total	...	...	...	...	16 cases

Paraffin sections cut and reports on the histological examination made on specimens—400.

The most prevalent disease condition in the list of diagnoses made from such specimens was Tuberculosis ; the second being Carcinoma.

### ENTOMOLOGICAL LABORATORIES

The following specimens have been received for identification :

Flies from garbage dumps	...	...	...	...	S.M.C. Health Dept.
Beetles from Bakeries...	...	...	...	...	"
Mosquito larvæ from sockets of telephone and electric light standards	...	...	...	...	"
Adult mosquitoes from dwelling houses	...	...	...	...	"
White ants from Municipal property	...	...	...	...	"
Termites from highway bridges	...	...	...	...	Chiao-Tung Univ.

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PHOTOGRAPHIC LABORATORY

Condensed Summary of Work Done in 1935 Jan.-Dec.

For	Photo- micrographs	All other subjects	Totals	Prints made	Slides made	Cine-film taken
Directorate ... ..	—	259	259	555	333	—
Division I ... ..	95	110	205	824	201	75 feet
Division II ... ..	19	267	286	1,005	273	162 "
Division III ... ..	245	448	693	2,634	817	845 "
Library ... ..	—	5	5	53	3	—
Experimental ... ..	14	45	59	86	46	—
Special ... ..	10	25	35	333	19	—
Technical Inst. ... ..	—	30	30	323	—	—
TOTALS ... ..	383	1,189	1,572	5,813	1,692	1,082

MEDIA ROOM

The amount of Media made during year 1935 was as follows :

Total amount of media ... ..	546.01	litres
Total tubes distributed ... ..	30,616	
Total flasks distributed ... ..	1,138	
Total plates made ... ..	94	

Of the above total amount of Media :

Meat Infusion Bouillon ... ..	amounted to	223.04	litres
Meat Infusion Agar ... ..	" "	109.91	"
C.B.P.P. Broth ... ..	" "	31.22	"
Brom Cresol Purple Sugar Medium ... ..	" "	50.69	"
Nutrient Agar ... ..	" "	21.20	"
Alkaline Nutrient Agar ... ..	" "	15.36	"
MacConkey's Medium ... ..	" "	12.22	"
Nutrient Gelatin ... ..	" "	10.97	"
Bile Medium ... ..	" "	5.55	"
Hormone Broth ... ..	" "	4.92	"

The remaining 60.93 litres consisted of Hormone Agar, Litmus Milk, Loeffler's Blood Serum Slant, C.B.P.P. Agar, Alkaline Peptone Water, Lead Acetate Agar, N.M.N. Medium, Potato Slant, Sabouroud's Medium, Petroff's Egg Medium, Glycerine Bile Potato Medium, Cooked Meat Medium, Glycerine Agar, Hiss' Serum Water, Corper Uyei Medium, Dunham's Peptone Water, Liver Digest Broth and Urea Splitting Medium.



# APPENDIX V

## MEMORANDUM OF SPECIMENS SENT TO OTHER INSTITUTIONS AND SCIENTIFIC WORKERS

<i>Institutes</i>	<i>Scientific worker</i>	<i>Nature of Specimen</i>	<i>Illustrating or Entitled</i>	<i>Remarks</i>
London School of Hygiene and Tropical Medicine.	Prof. R. T. Leiper	30 slides Tissue blocks in paraffin wax Snails 30 Liver flukes	Helminthological condition Schistosomiasis Clonorchiasis Oncomelania hupensis Clonorchis sinensis	Teaching " " "
London School of Hygiene and Tropical Medicine.	Prof. J. G. Thomson	10 Blood films 2 Spleen smears 2 Tissue blocks 20 Preparations	Malarial parasites Kala azar Kala azar Myxosporidia	Teaching " " Research
London Hospital for Tropical Diseases.	Dr. N. H. Fairley	4cc Antigen 2 Tissue blocks	Cercarial (Schistosoma Japonicum) Schistosomiasis	Research "
The British Museum, London.	Curator of Molluscs	Snails	O. hupensis from various districts M. cancellata P. chinensis Eulota fasciola Phædus shanghaiensis Lymnæa swinhoei Bithynia misella Eulota ravidia Opeas gracile Vivipara quadrata	Research and Identification
Various British Institutes in London.	Dr. F. F. Tang (transmitted by)	20 Microscopic preparations	Parasitological diseases	
Liverpool School of Tropical Medicine.	Professor Blacklock	20 Microscopic and macroscopic preparations	Helminthological specimens	Teaching and Educational
Department of Animal Pathology and Zoology, Edinburgh University.	Prof. Ashworth Dr. Morgan	30 Microscopic preparations	Helminthology and Protozoology	Teaching and Identification

<i>Institutes</i>	<i>Scientific worker</i>	<i>Nature of Specimen</i>	<i>Illustrating or Entitled</i>	<i>Remarks</i>
Department of Zoology, Glasgow University.	Dr. Margaret Jepps	20 Liver flukes	Clonorchis sinensis	Teaching
Department of Parasitology, University of Paris.	Prof. E. Brumpt	Various specimens	Parasitological diseases in China including Potamon crabs, water calthrops Relapsing fever	Museum
		Living spirochaetes in infected O. moubata		Research
Department of Parasitology, University of Paris.	Prof. E. Brumpt	Lutzia vorax adults, 3 males 3 females Armigeres obturbans adults 3 males 3 females	Entomology	Research
Department of Parasitology, Univ. of Pennsylvania, Philadelphia.	Dr. Ratcliffe	49 Microscopical pre- parations 3 Tissue blocks	Helminthology	Teaching
			Schistosomiasis Clonorchis sinensis	"
U.S. National Museum, Smithsonian Institute, Washington.	Dr. Paul Barch	Snails	Oncomelania hupensis from various districts M. cancellata P. chinensis Eulota fasciola Phædus shanghaiensis Lymnaea swinhoei Bithynia miscella Eulota ravida Opeas gracile Vivipara quadrata	Research
Hongkong University.	Prof. L. J. Davis	20 Preparations	Helminthological diseases	Teaching

<i>Institutes</i>	<i>Scientific worker</i>	<i>Nature of Specimen</i>	<i>Illustrating or Entitled</i>	<i>Remarks</i>
Hongkong University.	Prof. L. J. Davis	12 White mice 1 Mouse cage		Research
Yale in China, Changsha.	Changsha Hospital	40 Microscopic preparations	Helminthological diseases	Teaching
Department of Biology, Lingnan Univ., Canton.	Prof. H. T. Chen	10 slides—Wuchereria bancrofti microfilariae	Entomology	Teaching
Department of Biology, Ginling College, Nanking.	Prof. C. D. Reeves	Anopheles hyr. var. sinensis 10 adults 10 larvæ Culex pipiens var. pallens 10 adults 10 larvæ Plasmodium vivax 5 slides Plasmodium malarie 5 slides Plasmodium falciparum 1 slide	Entomology      Protozoology	Teaching
Central Hospital, Nanking.		90 vials each containing 30cc	New curative anti-typhoid serum	Research and treatment
Cheeloo University, Tsinanfu.	Dr. Struthers	2 Paraffin sections	Kala azar	Teaching
Cheeloo University, Tsinanfu.	Prof. G. F. Winfield	Anopheles hyrcanus var. sinensis 50 adults 50 larvæ Culex pipiens var. pallens 10 adults 10 larvæ Wuchereria bancrofti microfilarie 10 slides	Entomology	Teaching

<i>Institutes</i>	<i>Scientific worker</i>	<i>Nature of Specimen</i>	<i>Illustrating or Entitled</i>	<i>Remarks</i>
Department of Biology, Fukien Christian Coll., Foochow.	Dr. T. H. Cheng	Plasmodium vivax 10 slides Plasmodium malarie 10 slides Plasmodium falciparum 2 slides	Entomology	Teaching
Department of Biology, Hangchow Christian Coll., Hangchow.	Prof. A. W. March	Wuchereria bancrofti microfilarie 16 slides Plasmodium vivax 8 slides Plasmodium malarie 8 slides	Entomology	Teaching
Chekiang Public Health Administration, Hangchow.	Dr. Rose	Set of Molluscs	O. hupensis from various districts M. cancellata P. chinensis Eulota fasciola Phædus shanghaiensis Lymnæa swinhoei Bithynia misella Eulota ravidia Opeas gracile Vivipara quadrata	Educational Museum
National Medical College, Shanghai.	Prof. G. Chu	48 Preparations	Helminthological diseases	Teaching
National Medical College, Shanghai.	Prof. G. Chu	Anopheles hyr. var. sinensis 25 adults, 25 larvæ Culex pipiens var. pallens 25 adults, 25 larvæ	Entomology	Teaching
Hygienic Laboratory, Greater Shanghai Municipality.	Dr. M. Y. Dzen	12 species of Shanghai mosquitoes : adult male and female of each	Entomology	Public Health Education

<i>Institutes</i>	<i>Scientific worker</i>	<i>Nature of Specimen</i>	<i>Illustrating or Entitled</i>	<i>Remarks</i>
S. M.C. Public Health Department, Shanghai.	Dr. J. H. Jordan	12 species of Shanghai mosquitoes : adult male and female of each	Entomology	Public Health Education
S.M.C. Hospitals, Shanghai.		50 vials each containing 30cc	New curative anti-typhoid serum	Research and Treatment
St. Luke's Hospital, Shanghai.		30 vials each containing 30cc	New curative anti-typhoid serum	Research and Treatment
Red Cross Hospital, Shanghai.		15 vials each containing 30cc	New curative anti-typhoid serum	Research and Treatment
Margaret Williamson's Hospital, Shanghai.		30 vials each containing 30cc	New curative anti-typhoid serum	Research and Treatment
St. Elizabeth's Hospital, Shanghai.		6 vials each containing 30cc	New curative anti-typhoid serum	Research and Treatment
Lester Chinese Hospital, Shanghai.		35 vials each containing 30cc	New curative anti-typhoid serum	Research and Treatment
Keylock & Pratt.	Dr. McWhirter	108cc Vaccine	B. bronchisepticus (Distemper Vaccine)	Prophylactic treatment of dogs
Chiao-Tung University, Shanghai.	Prof. A. F. Barker	Sheep's wool Specimens in wax blocks 6 specimens and 12 microscopic preparations	To demonstrate cross cut sections of the wool fibres	Research
C.M.A. Research Council.	Department of Medical Statistics, H.L.I.M.R.	10,000 S T D of Dick Test Toxin	Scarlet Fever	Research
C.M.A. Research Council.	Vide Department of Medical Statistics, H.L.I.M.R.	120 Cholera diagnostic outfits (21 returned)	Cholera	Research



<i>Institutes</i>	<i>Scientific worker</i>	<i>Nature of Specimen</i>	<i>Illustrating or Entitled</i>	<i>Remarks</i>
Lister Institute, London.		4 Cultures	P.P. Virus Tang P.P. Virus W.D. P.P. Virus M.D. P.P. Virus Steer X	Research
National Research Institute, Hampstead, England.	Dr. F. F. Tang (for Research)	8 Cultures	P.P. Virus strain German P.P. Virus strain Lister P.P. Virus strain Khartoum P.P. Virus strain W.D. P.P. Virus strain M.D. P.P. Virus strain Tang P.P. Virus strain Abattoir I P.P. Virus strain Wei Foong	Research
Sun Yat-sen's University, Canton.	Dr. Chen	1 Culture	T.B. bovine	Research
Public Health Laboratory, Canton.	Mr. Lee Pond	6 Cultures	B. typhosus Rawling B. typhosus 901 "O" B. dysenteriae Shiga B. dysenteriae Flexner B. dysenteriae Sonne B. dysenteriae Schmitz	Diagnostic Work
National Epidemic Prevention Bureau, Nanking.	Dr. Edgar Chen	3 Cultures	B. pestis strain V B. pestis strain g.p. B. pestis strain C	Vaccine Preparation
Hwa Mei Hospital, Ningpo, Chekiang.	Dr. L. C. Ting	10 Cultures	B. typhosus Rawling B. typhosus 901 "O" B. paratyphosus A B. paratyphosus B B. paratyphosus C B. dysenteriae Shiga B. dysenteriae Flexner B. dysenteriae Strong B. dysenteriae Hiss-Y V. cholera	Diagnostic Work

<i>Institutes</i>	<i>Scientific worker</i>	<i>Nature of Specimen</i>	<i>Illustrating or Entitled</i>	<i>Remarks</i>
Huchow General Hospital, Huchow, Chekiang.	Dr. F. P. Manget	9 Cultures	B. typhosus Rawling B. paratyphosus A B. paratyphosus B B. proteus X.19 V. cholera B. melitensis B. abortus B. dysenteriae Shiga B. tetanii	Diagnostic Work
S.M.C. Laboratory, Shanghai.	Dr. Dunscombe	2 Cultures	B. proteus X.19	Diagnostic Work
Public Health Laboratory, Greater Shanghai.	Dr. M. Y. Dzen	9 Cultures	B. diphtheriae B. diphtheriae Miss Hou T.B. bovine 4 strains Streptococcus viridans B. mellei Dzen B. mellei Wang	Research and Diagnostic Work
National Medical College of Shanghai, Shanghai.	Mrs. D. H. Wong (Bact. Dept.)	30 Cultures	Pneumococcus B. dysenteriae Hiss-Y B. dysenteriae Flexner V B. dysenteriae Flexner W B. dysenteriae Flexner X B. dysenteriae Flexner Y B. dysenteriae Flexner Z	Research and Diagnostic Work
Infectious Diseases Hospital, Thibet Road, Shanghai.	Dr. Chow Chen	13 Cultures	Staphylococcus aureus Staphylococcus albus Streptococcus hemolyticus Streptococcus viridans B. coli communior B. coli communis B. enteritidis B. pyocyaneus B. welchii B. suispestifer Reading B. suispestifer Thompson B. suispestifer New-port B. acidilactici	Research and Diagnostic Work

<i>Institutes</i>	<i>Scientific worker</i>	<i>Nature of Specimen</i>	<i>Illustrating or Entitled</i>	<i>Remarks</i>
The University of Shanghai, Shanghai.	Prof. C. C. Chen	3 Cultures	<i>Sarcina lutea</i> <i>Spirillum metchnikovi</i>	Teaching
St. Luke's Hospital, Shanghai.	Miss A. A. McKae	11 Cultures	<i>B. ærtrycke</i> <i>B. paratyphosus A</i> <i>B. paratyphosus B</i> <i>B. abortus</i> Bang No. 6 <i>B. melitensis</i> <i>B. enteritidis</i> <i>B. dysenteriae</i> Strong <i>B. dysenteriae</i> Flexner <i>B. dysenteriae</i> Shiga <i>B. dysenteriae</i> Hiss-Y <i>B. typhosus</i> 901 "O"	Teaching and Diagnostic Work
Joffick's Laboratory, Shanghai.	Dr. S. D. Joffick	2 Cultures	<i>B. abortus</i> <i>B. melitensis</i>	Diagnostic Work
Keylock & Pratt, Shanghai.	Drs. Edgar and McWhirter	512cc Vaccine	Pleuro-pneumonia	Research and Prophylaxis
Lester Chinese Hospital, Shanghai.		80cc Vaccine 120cc Vaccine	<i>Streptococcus</i> <i>Staphylococcus</i>	Treatment Treatment

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